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THE AUDION

A New Receiver for Wireless Telegraphy

By Lee De Forest

[This important paper was read by Mr. De Forest before the 210th meeting of the American Institute of Electrical Engineers at New York on October 20, 1906. The author acknowledges his indebtedness for the name "The Audion" to his assistant C. D. Babcock who has materially helped Dr. De Forest in the development of the device. A careful reading of this valuable contribution to technical literature is invited.—THE EDITOR.]

THE story of the development of a device of a distinctively new order, from its first inception to its practical reality, adds a human interest to its description which is perhaps too often lacking among scientific records. In 1900 when I was beginning experiments on the electrolytic responder, it was my good fortune to have to work upon it at night in my own room, at a table beneath a solitary gas-burner with Welsbach mantel. My source of hertzian waves was the discharge of a small induction-coil placed in an opposite corner and set into operation by a key closed by pulling a string.

One night I noticed to my surprise a decided diminution in the light from the incandescent mantel whenever the coil was sparking. The constant recurrence of this effect induced me to investigate. By proper adjustment of the inflow of gas and air to the burner, an almost complete extinction of its light was obtained during the sparking of the coil. Another adjustment even allowed an increase of the light above normal. For several days I was elated over the tremendously sensitive and altogether novel type of hertzian-wave responder thus accidentally discovered. But alas for the over-sanguine spirits of the young investigator! When I thrust my induction coil into a closet and closed the wooden door, thus shutting off the sound of its vibrator and spark, my gas-light ceased to fluctuate.

I found I had merely discovered an extremely responsive form of the sensitive gas-flame, and that a bunch of jingling keys, or a smart clapping of the hands were almost as efficient generators of these hertzian waves as was my induction coil. To hopes unrealized this was indeed the "Light that Failed."

But the few days of illusion had set me thinking. Here in the flame around this incandescent mantel was matter in a most mobile, tenuous state, extremely sensitive to sound and heat vibrations, infinitely more delicate than any arrangement of solid or liquid particles. Why should it not then in some phase or fashion respond to the hertzian vibrations also?

Unable to dislodge this conviction from my mind, I began later to search for the genuine response to electric vibrations in the gas-flame. I found the conductivity of the incandescent mantel surprisingly small, however, for any voltages which would be practical in a wireless receiver.

By soaking the mantel in a potassium or sodium solution and drying, I was finally able to pass a small current from a dozen dry cells through the flame surrounding it, using two platinum electrodes with a telephone receiver in circuit, and get a faint response to the genuine hertzian wave. The discovery that the effect predicted was actually present was intensely gratifying.

Experiments followed with the Bunsen-burner and other forms of flame. In the coal-gas flame the exterior luminous portion is positively electrified, the interior negatively. To render these flames sufficiently conducting, salts of the alkali metals were introduced. Of these the caesium, potassium and sodium salts are the most conducting, and in the order named. These salts were either injected into the flames as solution, or preferably put in a little platinum cup held in the luminous part of the flame and made the cathode of the telephone circuit.

A platinum wire or disk held about 2 mm. above this cup acted as anode. The antenna and earth connection, or the two terminals of the oscillating receiving circuit, were connected to these platinum electrodes. An electromotive force of 6 to 18 volts, supplied by a battery of dry cells was sufficient to give a current of several milliamperes through the colored flame.

This early form of Audion, the flame receiver, was remarkably sensitive to weak high-frequency oscillations. The sound heard in the telephone was an exact reproduction of that of the transmitter spark, in pitch, variation of intensity, etc.

It was observed that the increase of current with electromotive force did not follow Ohm's law; a saturation value of the current was observed. Wilson has found that the maximum current which a salt vapor in a flame can carry is equal to the current which if passed through an aqueous solution of that salt would electrolyze the same quantity of the salt as was imparted during the same unit of time to the heated gas.

Beyond this saturation value the current will not rise until the electromotive force is great enough to enable the field itself to ionize the gas; that is, until the velocity imparted to the negative ions by the field is sufficient to enable them to separate the gas molecules with which they collide into positive and negative ions.

The conduction through flames under the conditions I am describing is due chiefly to the negative ions generated, and these are chiefly in the vicinity of the metallic cathode. It is necessary that the alkali vapor comes in contact with the glowing metal. The increase of conductivity of a flame by the addition of a salt may amount to several hundred per cent, and is due not to the presence of the metallic atoms in the flame itself, but to the increase in ionization produced by the salt at the electrodes, notably the cathode.

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The velocity of the negative ions in flames at atmospheric pressure increases rapidly with the temperature. Thus at 2000° cent. their velocity is approximately 40 times that at 1000° cent. At 1000° cent. the ratio of velocity of negative ions to positive ions is calculated as $\frac{26}{7}$. At 2000° cent. this negative ion velocity in flames is about 1000 $\frac{cm}{sec}$ for a potential gradient of one volt per cm.

Now suppose the average velocity of a negative corpuscle to be proportional to the electric force; this velocity, for a potential drop of 10 volts between the electrodes as I use them, is of the order required to traverse the distance between the incandescent body and the platinum anode during the time of one-half the wave period of the electrical oscillations ordinarily used in wireless telegraphy.

I shall return later to the bearing which this fact has upon a suggested explanation of the effect of the hertzian oscillations upon the gas receiver.

On account of the ionization of the gas near the incandescent metal, and the greater velocity of the negative over the positive ions, it is to be expected that even if no external electromotive force be applied to the electrodes, and one of these be relatively cold, a current will pass along a wire

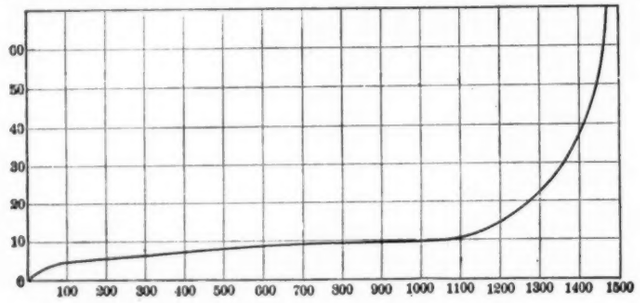


Figure 1.

connecting the two electrodes, whose direction is negatively from the hotter to the cooler body in the flame. In other words the colder body will be the anode, positively charged.

Now if the hertzian oscillations traverse the hot gas, the momentary potentials thereby impressed upon the moving ions will conceivably interfere with their motions, or with the rates of recombination between the positive and negative ions, and thus effect the current flowing through the wire. A telephone connection between the electrodes indicates that changes of a surprising amount in the momentary potential difference, or flux, across the electrodes are effected by the high frequency oscillations, even when no external battery is applied.

When a battery of from 6 to 20 dry cells is connected across the two electrodes, the positive terminal to the cooler electrode, the potential current curve for the conductivity of the gas is at first approximately a straight oblique line, the current through the flame increasing with the electromotive force.

Soon, however, this proportionality of current and voltage ceases, and a stage of saturation is reached where there is no appreciable increase of current with increase of voltage. But when the potential difference is raised sufficiently to ionize the gas, a stage is reached where the current increase is far more rapid than that of potential difference. This last potential gradient depends upon the pressure of the gas; it is directly proportional to the pressure. This is given by Thomson as about 30,000 volts per cm. for atmospheric pressure; but with incandescent gases in an enclosed vessel at one mm. pressure a gradient of 40 volts per cm. is sometimes sufficient to produce this critical stage.

In the case of the flame the distances between the electrodes figures very little in the amount of current flowing, the potential drop, or the sensitiveness to hertzian oscillations, because most of the ionization at low voltages takes place at the electrodes.

The size and shape of the electrodes are of small moment. I prefer a trough anode 1 cm. long by 2 mm. wide, holding the potassium salt, as cathode, and a small platinum wire parallel thereto and held 2 to 10 mm. above it as anode.

The trough electrode should preferably be at the upper tip of the oxidizing flame at its junction with the reducing flame. When this is made negative the current is saturated with a comparatively small potential difference. The gas-burner itself may be used as one electrode. The flame must be steady and kept rich in salt. The current of uprushing flame makes a rumbling noise in the telephone, which may interfere with the detection of faint signals. This rumbling sound increases with too great applied potentials.

The temperature, especially of the electrodes, is an important factor. At red heat these give off positive corpuscles; at white heat both positive and negative appear, the latter predominating. The electrode containing the salt should always be incandescent, so that the excess of negative ions given off and streaming towards the other electrode will increase, rather than diminish the current due to the flame itself. The extreme sensitiveness of the flame when ionized to thermal variations is illustrated by the fact that a distinct response is heard in the telephone receiver when the mere tip of a cold pin is suddenly introduced into the flame. The sudden introduction of a cold body into the active part of the flame always reduces the response. The salt is best placed in, or on, one of the electrodes rather than held in the flame in an independent receptacle, or injected into the gas.

The applied electromotive force is a determining factor in the sensitiveness of this receiver. The response seems greatest where the potential current curve is passing from the oblique to the horizontal portion, where the saturation value is about to be reached. Under these conditions the sensitiveness of the flame Audion is of the same order as that of the electrolytic receiver using a glass-jacketed electrode. The flame is not most sensitive when the flux is greatest. There is a close relation between the degree of heat and the critical impressed voltage.

Considerable difficulty was found in getting an absolutely steady flame, even when protected by a chimney, as the slightest air current will deflect the sensitive portion from the electrodes, altering the sensitiveness of response.

I next sought the phenomenon in the hot conducting gases of the electric arc. If a wire be connected to the positive carbon of the arc and lead through a telephone to a third electrode, platinum or carbon, which is inserted into the border of the arc, a considerable current passes through the telephone. If these two electrodes are now connected to the terminals of the receiving oscillating circuit, the conduction of the leak current across the gas to the third electrode is sensibly affected by the arriving hertzian oscillations, if sufficiently intense. A local battery can also be inserted in series with the telephone, but the voltage drop across the arc is usually too great to require this.

Even when the arc is fed from a storage-battery and cored carbons used, the hissing and frying noises in the telephone (probably due to the oxidation of the terminal by the air) are generally too troublesome to allow a clear reading of weak signals with this form of Audion.

The principles involved in its operation are much the same as for the flame Audion. And although the intense ionization produced by the heat of the arc renders it extremely sensitive to slight local variations, its practical requirements make it less available as a wireless receiver.

Inasmuch as the gases ionize more readily at lower heats and are in their most mobile, delicate and sensitive conditions in vacuum, it seemed to me certain, after experiments with the flame, that the attenuated and ionized gases around an incandescent filament would undergo very considerable changes when subjected to hertzian oscillations.

Elster and Geitel, beginning in 1882 a systematic investigation of the ionization produced by incandescent metals, frequently employed an exhausted glass vessel containing an insulated platinum plate, stretched close to which passes a fine metallic filament brought to incandescence by an electric current.

Ordinarily at atmospheric pressures and red heats a positive charge was produced upon the plate, of the order of a few volts. This potential increases until the wire is at a yellow heat. As the wire gets hotter the potential decreases, until at a bright white heat the potential of the plate is very slight. Dinimishing air pressure has but slight effect upon the plate potential until very high exhaustions are reached, when this potential begins to diminish and may even change sign, and as the exhaustion proceeds may reach a very large negative value. This pressure where the plate charge changes sign depends upon the temperature of the filament, being higher at higher temperatures.

Long-continued heating and expulsion of gas from the incandescent metal play a considerable part in the electrical phenomena. Long-continued incandescence favors the negative electrification of the plate. The presence of oxygen aids in the carrying off of a negative charge, thus producing negative electrification around the wire; hence the action of oxide of metal on filaments tends to increase the discharge of negative electricity. But oxygen also hastens the disintegration of the filament.

Gases which are disassociated by heat conduct on quite a different scale from those like air, hydrogen, or nitrogen. Examples of such are the vapors of iodine, bromine, chlorine, potassium, iodine, etc. These furnish a much larger supply of ions than the others. This dissociation occurs chiefly where the gas is in contact with the glowing electrodes. Of the metals, sodium and potassium have the highest conductivity under the above conditions, for the emission of negatively electrified corpuscles from sodium atoms occurs even at low temperatures; and I have used carbon filaments coated with a potassium compound. The conductivity of cold mercury vapor does not seem greater than that of air.

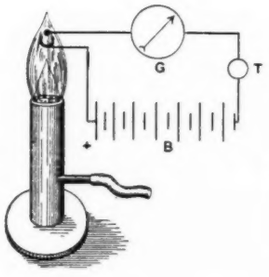
With hydrogen, the plate becomes negatively electrified even at atmospheric pressure; and when the filament is carbon instead of platinum the electrification on the plate is always negative. This means that the gas will discharge the plate if positively electrified; that is, a positive current will pass from the plate to the filament in the gas.

The electrification produced in the neighborhood of an incandescent wire is a complicated effect; it depends on the temperature and nature of the filament, and on the nature and pressure of the gas. It furthermore depends upon the electric and magnetic forces to which the vessel is subjected; and I have found that the shape and area of the plate or plates, the condition of its surface and edges, as well as its distance from the filament, are very important factors.

If the metal plate be connected by an outside wire to the positive terminal of the hot filament, a leak-current from the plate to the filament through the gas will be set up, as Elster and Geitel first found, passing mainly to that portion of the filament near its negative terminal. If the resistance of the lamp filament and the lamp's voltage be high, a very considerable leak current may thus be set up.

A battery of from 3 to 18 dry cells is connected between the positive end of the filament and the platinum plate *w*, the latter being connected to the positive pole. The saturation current increases rapidly with the heating current through the filament, which also increases the velocity of the negative ions, as does also an increase in the applied electromotive force plate and filament.

The rate of discharge of negative electricity from glowing carbon greatly exceeds that from platinum, while that from tantalum and other of the newer filaments, given the same heating current, surpasses the rate of discharge from carbon.



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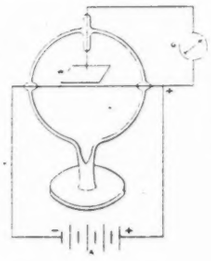

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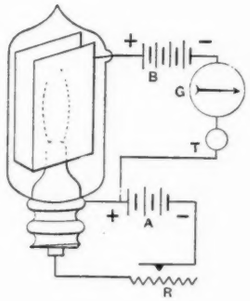

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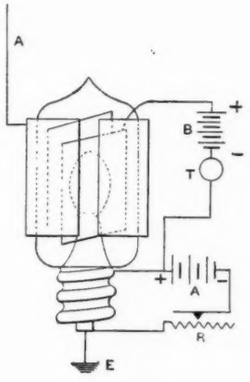

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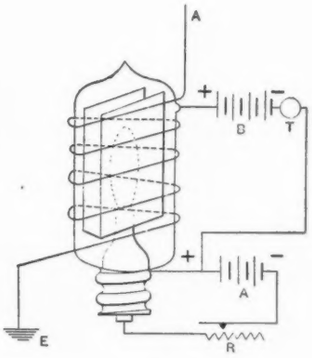


Figure 6.

Thomson states the equation connecting the saturation current with the temperature as

$$\left(I = A\, O^{\frac{1}{2}} e^{-\frac{b}{o}}\right)$$

where *o* is the absolute temperature, *a* and *b* are constants.

At 2000° cent. this rate of emission from a platinum wire in high vacuo amounts to 0.1 ampere per sq. cm. of hot surface. For carbon this current can equal several amperes per sq. cm. of hot surface. In the Audion the flux current ordinarily ranges from 1 to 5 milliamperes.

The metal dust, or even vapor, from the incandescent filament may play a part in the phenomena but not a controlling one. Thomson has shown that the value of e/m for the carriers of electricity in the type of exhausted vessel described is the same as its value for the carriers of the negative electricity in the cathode rays, or in the discharge of negative electricity from metals illuminated by ultra-violet light. In fact in many ways the behavior of the Audion, notwithstanding the extremely low potentials used, is very similar to that of a cathode-ray tube; and in one or two small pea-lamps where the anode disk was close to the bend of the filament I have actually obtained, at only 22 volts, a blue-white beam of light playing between the filament cathode and the anode. Upon the approach of a powerful magnet this beam could be concentrated and deflected. A great increase in the current through the telephone marked the formation of this beam, and a violent hissing

or squealing sound began when the magnet was approached.

The corpuscles at the filament are attracted by the metal of the filament, and to escape into the surrounding space they must be given sufficient kinetic energy to carry them through the surface layer where this attraction for the carriers is appreciable. Thus as the temperature of the filament increases, a larger number of the carriers can escape from the wire. But the saturation values of the flux current do not depend upon the velocity of the ions, but only upon the number of ions produced in unit time at the surface of the hot metal.

The source of ionization is confined to the gas immediately surrounding the filament. The velocity of the ion at any instant is dependent on its distance from the filament, because the temperature is not uniform between filament and plate. The ratio of the velocities of negative to positive ions varies greatly with the temperature: thus they are given as 1000 to 62 at 2000°.

This fact explains why the positive conductivity of the gas in the vessel is almost entirely from the cold to the hot electrode in the gas, and not in the reverse direction; and why this unidirectional quality is more marked for higher temperatures of the cathode, the anode being kept cold.

In the form of Audion illustrated in Fig. 4, I employ two platinum wings parallel to the plane of the bowed filament and about 2 mm. on either side of it. These wings are soon coated with an iridescent deposit from the metal filament, especially at the portions opposite to the negative half of the filament. They become quite hot at this short distance, but not sufficiently hot to take part in the ionization of the gas.

When connected in the oscillation circuit as shown, properly attuned to the receiving electromagnetic impulse from the antenna, the Audion under proper adjustment of heating current and battery B potential is extremely sensitive, giving response in the receiving telephone several times as loud as any other form of wireless receiver when subjected to the same impulses. It is, however, less sensitive to atmospheric or static disturbances, which are strongly damped or a-periodic.

I find the device extremely closely tuned with the syntonizer, for its operation seems to be dependent upon the sum total of the energy received from the complete wave-train rather than upon the maximum first impulse of the train. In other words, while instantaneous as far as our senses or instruments can perceive, its action is sufficiently sluggish to be determined by the additive effect of the entire received electro-radiant energy through a short time-interval.

When the filament is first lighted, an appreciable interval, about one-quarter second, elapses before the full sensitiveness is established. Before the flux reaches a steady state there is a period during which the number of ions is steadily increasing. As a result of the colliding of the initial ions with the gas molecules the number of ions and the current rapidly increase, until an equilibrium is finally attained.

The Audion, to a greater extent than any other responder, is self-tuned. I mean that by regulating the heating current, the potential between wing and filament, or the distance between these, the Audion can be made to a great extent selective *per se* to certain received impulses. And the determining factor here is not merely the frequency of the electrical oscillation; the spark frequency, or factors determining the total amount of energy received during a very brief unit of time, determine to an extent the amount of its response. Thus with 12 volts across it, it may give a loud response to a transmitter *A*; and with 10 volts "bring in" another transmitter *B* to the almost complete exclusion of *A*, although *A* and *B* are of equal power and of approximately the same wave-length, but differing considerably in spark frequency. Similar discrimination can be produced by adjustments of the heat of the filament, which also governs the amount of flux through the gas.

This flux is generally reduced when the Audion is placed in a strong magnetic field, especially when the lines of force pass through the gas parallel to the plane of the wings, at right angles to the electric field. By this means also a tuning can be effected.

Again it is not necessary to connect the anode to a terminal of the oscillating circuit. One terminal may be attached to a metal sheath or ring surrounding the glass vessel, thus forming a condenser with the filament or the conducting gas within the tube. In this case the adjustment of the syntonizer is generally different from that required for the same oscillation frequency, when the interior wing is directly connected in the oscillation circuit. In this condenser arrangement also the sound heard in the telephone changes its quality to an extraordinary degree, being of a dull, muffled nature rather than sharp and staccato. Signals of this quality are sometimes much more readily distinguished from the "static" disturbances which so frequently render wireless signals difficult to read. The operator has thus a ready means of changing the quality of the received signals to suit the conditions. This latter type of Audion is the one I have found most serviceable in practice.

The Audion may even be placed in the space between two plates of an air condenser in the oscillating circuit. A flat-walled type of tube is preferred for this arrangement. Again the electrical oscillation may be led through a coil of wire wound round the outside of the tube (Fig. 6), and not through the Audion at all, or through a flat coil brought up close to the tube, with its axis perpendicular to the filament. In this arrangement it is chiefly the electromagnetic component of the passing oscillation which affects the motion of the ions within the vessel. The ions are readily influenced by a magnetic field.

By shifting the syntonizer connections from the wings to this helix, I have been able to cut out completely signals from a transmitting station so near as to baffle all attempts with the ordinary tuner methods, and to bring in other relatively faint signals.

The Audion has the further advantage of entire absence of adjustment in the receiver itself. It gives no evidence of fatigue under any conditions of use. Furthermore, it requires no protection from the violent impulses of the transmitter at its own station, whereas the sensitiveness of the electrolytic receiver is completely destroyed by one such violent impulse, unless its small electrode is protected by a shunting switch.

I have arrived as yet at no completely satisfactory theory as to the exact means by which the high-frequency oscillations affect so markedly the behavior of an ionized gas. Fleming points out that when the cold plate of the Elster-Geitel tube is connected to the positive end of the filament, and the two put in a high-frquency oscillation circuit, only the positive half of the oscillation can pass from the plate to the filament across the gas. He uses this principle to rectify the hertzian oscillations, and applies the unindirectional currents of the oscillations themselves to operate a sensitive galvanometer, or direct-current instrument, for quantitative measurements over very short distances.

When an independent external source of electromotive force is applied, in the manner I have described, the action becomes quite different. It then operates as a *relay* to the hertzian energy instead of merely rectifying this energy so that it can be used directly to give the sense signal.

The Audion therefore is tremendously more sensitive and available in practical wireless. A sensitive direct-current instrument in the *B* circuit shows a steady deflection varying not a whit, by increase or decrease, during the reception of strong "wireless" signals. An electrolytic receiver

or "polariphone" under similar conditions would cause a great deviation in the deflection of a milliammeter, although the signals in the telephone with the electrolytic are not so loud as with the Audion.

I have connected two Audions in series in opposition in the oscillating circuit, each with its separate heating circuit and still heard the signals in the telephone connected to the second Audion equally well whether the wing in the first be connected to the wing or to the filament of the second.

When one of the tubes is unlighted, or if lighted its *B* circuit is open, no high frequency impulses pass through it unless the wing and filament are very close together. When cold it acts merely as a condenser whose armatures are the wings and filament and whose capacity is extremely small.

I have laid considerable stress upon the potential gradient or "variation" layers which exist near the surface of the electrodes when the external applied electromotive force is considerable, for the reason that their existence serves to play a very important role in the response of the Audion to minute high-frequency oscillations.

If the velocity of the negative ions is very large compared to that of the positive ions, the curve representing the distribution of electrical intensity between the two electrodes is represented by the following, which is typical:

When ions of both signs are present in the gas and when the electric field is so strong that most of the positive ions are driven from the anode and the negative ions from the cathode (the filament), we will have an excess of cations in front of the anode and of anions surrounding the cathode.

It is seen that the variation in potential lies chiefly in the thin layers of gas in front of the two electrodes. It is convenient to speak of these regions as the "variation" layers. As Thomson points out, in passing from the inside to the outside of the layer of ionized gas we have to pass across a layer of electricity. This will produce a discontinuity in the electrical intensity equal to 4π times the surface density of the electrification.

There may thus be a great difference between the electric intensity inside the layer and that just outside. The potential drop across the layer is proportional to the square of the current; the falls of potential at the positive and negative electrodes are proportional to the squares of velocities of the positive and negative ions; and the velocity of the ions is proportional to the electric force acting upon them.

These variation layers at the electrodes of the Audion make still more striking its similarity with the cathode-ray tube. In the cathode tube a sudden drop in potential called the "anode fall of potential" occurs quite close to the anode; and in the layer called the Crookes dark space, or cathode dark space, there is a still greater fall in negative potential. But the voltages here are enormously higher than those in the Audion. As the gas pressure in the cathode tube diminishes, the dark layer, or the cathode drop layer, becomes broader. $D = \alpha + \beta \frac{1}{s}$; that is, the width of the dark space is proportional to the mean free path of the molecules, beyond a certain distance α in front of the cathode. Schuster found that the thickness of the cathode drop layer increased slightly with the current passing through the gas; but Wehnelt found just the reverse. Both may be correct on different sides of some particular value of the current for which the width of this space is a minimum. This is interesting in view of the fact that there is a certain current flux across the gas of the Audion for which the response of the hertzian oscillations is maximum; supposing this response is maximum when the width of the variation layer around the filament is minimum.

Within the cathode layer there exist only negative ions, these being shot off from the cathode. Right outside of this, in the region called the "cathode glow" ionization of the gas from collisions with these negative ions begins, and the width of the cathode dark space is about the range of the "mean free path" of the ions.

If a similar state of affairs exists around the filament of the Audion, and if this mean free path of the cations coincides with the excursion of the corpuscles during one-half the oscillation period of the impressed hertzian vibration, we might expect under these conditions a maximum effect of response to oscillation of the particular wave-frequency. Or a similar effect might be expected if the excursion in question is that of an ion from the cathode across the gas up to the layer surrounding the anode.

The extent to which the sensitiveness of the Audion is governed by a very slight change in the heating current, or

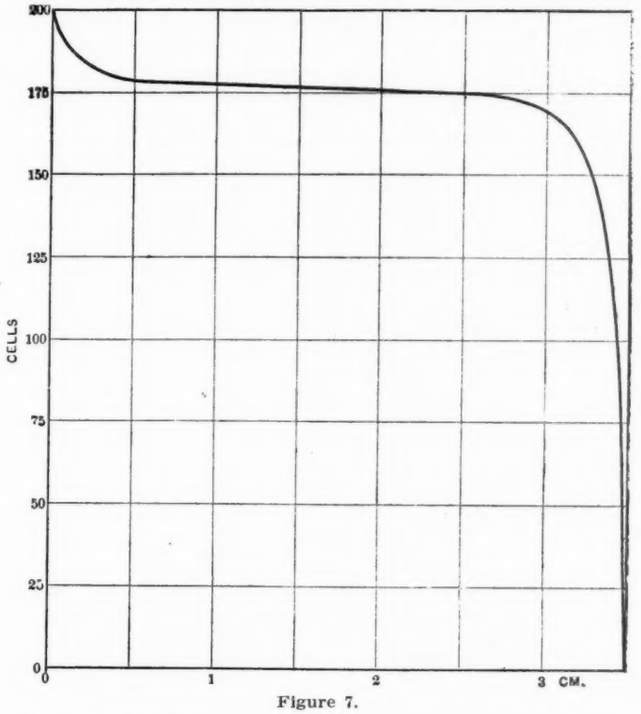


Figure 7.

in the potential drop across it, seems to lend plausibility to such an explanation. And it has been shown that in conducting flames at atmospheric pressure, a negative ion acting under a potential gradient of 10 volts per mm. would travel approximately 1 mm., or a commonly found distance between the electrodes in the Audion, in $\frac{1}{1{,}030{,}000}$ part of a second, which time-interval is of the order of one-half the wave period of some of the longer oscillations used in wireless telegraphy. For reduced gas pressures the natural excursion of the ion would be more rapidly accomplished, but its velocity can be governed within wide limits by regulating the applied electromotive force. When we send more current through the filament we increase the potential difference between filament and anode as well as increase the heat. Both changes act to increase the ionic velocity.

In Humstedt's experiments where a cathode-ray tube was exposed to high-frequency oscillations, the width of the cathode drop layer, or dark space, diminished as the frequency of the oscillations increased; as if there might be some connection between the period and the time involved in the immigration across. And many facts observed in connection with the Audion otherwise difficult to explain tempt one to suppose that here the degree of response is connected with the relation between the product of velocity of the ions by the distance between the electrodes, and the period or half period of the electrical oscillations received.

When the anode consists of two parellel plates instead of

a cylinder there will be a maximum of positive electric density along their vertical edges. The more intense parts of the electric field will involve the larger number of ions, and on the anode these will generally be located at the vertical edges of the parallel plates, provided these are not too far from the filament.

With this type of anode a peculiar and sudden inflection point in the current-flux diagram, as the heating current is gradually increased or decreased, is noticed. The flux goes on increasing, then suddenly drops back to a lesser value; at the same time a click is heard in the telephone in

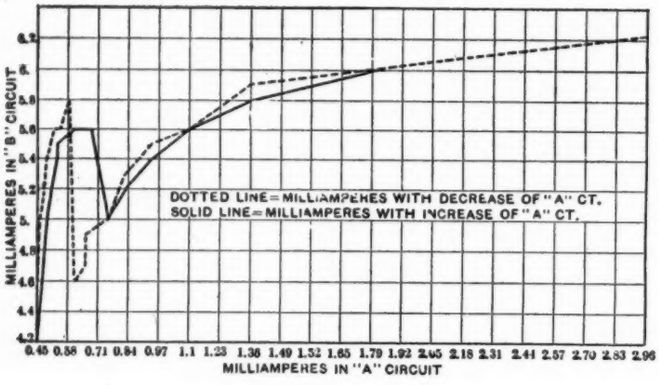

DOTTED LINE = MILLIAMPERES WITH DECREASE OF "A" CT.
SOLID LINE = MILLIAMPERES WITH INCREASE OF "A" CT.
MILLIAMPERES IN "B" CIRCUIT
MILLIAMPERES IN "A" CIRCUIT

Figure 8.

the B circuit. Then as the heating current is still further increased the B flux is again increased. These same cusp points in the curve are obtained if the A circuit be kept constant and the B voltage is increased instead.

Similarly, a click is heard when the flux current is being reduced from a higher value, only the location of the cusp on the curve of decreasing current is not coincident with but lags behind that observed when B is being increased. This second cusp point shows a sudden *increase* in the flux current, when the critical point is reached, to a value previously passed through. Naturally the sharpness of these cusp points can be smoothed out or quite obliterated by putting impedance in the B circuit in series with the telephone.

The diagram (Fig. 9) shows the relative magnitude of these sudden alterations in the flux current obtained with a certain sample Audion, and also the decided hyteresis effect, showing how the actual B current lags behind the increasing or decreasing electric field which produces it. This hysteresis effect is very like that obtained when the molecular structure of iron is altered under a changing magnetic field. Doubtless it is here due to a reluctance of the ions to accommodate their paths and velocities to the impelling electric forces; and the area included between the two curves represents the work lost in accomplishing this conformation.

These hysteresis curves are always obtained even though the anode is in the form of a cylinder or flattened cylinder without the vertical edges; but the *reactive* cusp points in the curves are never obtained save with two plan anodes connected together.

Zeleny has found a similar very curious hysteresis effect in the currents obtained from the ions from a platinum wire when heated and exposed to ultra-violet light. When the metal was cooling these currents were greater than those for the same temperature when the metal was being heated. In this case heating the wire produces some change in its surface, possibly in the amount of gas condensed thereon or absorbed by it, from which it recovers very slowly.

As B voltage is increasing and A current is increased and decreased, I find that the points at which the cusps occur on the increase and decrease A-B curves coincide more and more nearly and at the same time these cusps become less and less violent. The hysteresis effect is less pronounced as the B voltage is increased. As shown in the curves for a large B flux the two A-B curves for increasing and decreasing A current coincide almost exactly until B flux is reduced to a certain amount. They may again cross each other at a lower point of B flux, again diverge, and then coincide once more near their origin. These curves were all taken with Audions of the double-wing type, which feature may account for some of the very peculiar characteristics observed.

The filament is always at some part nearer to one wing than the other. Hence the B flux is cheifly concentrated on this wing or portion of wing, like a beam of cathode rays. We may suppose that as the B voltage is increased, as when more heating current is passed through the filament, the flux is increased and spreads out over this wing until a new sheaf or "ray" of ions, starting off from the filament from another part or in a new direction, suddenly leaves that wing and takes by preference a shorter path to the opposite wing. We would suppose that a new path thus taken would first be located on one of the vertical edges of the wings parallel to the filament.

This sudden diminishing of the intensity or density of the original beams of ions may be accompanied by a decrease in the velocity of propagation of the ions, and thus the resultant flux be actually less than before. The reverse operation will occur when the B flux is being decreased from a high value.

When the anode consists of one wing only, no such reverse cusp-points, or reversals of the flux increment, have been obtained. With a single-plane anode, however, there

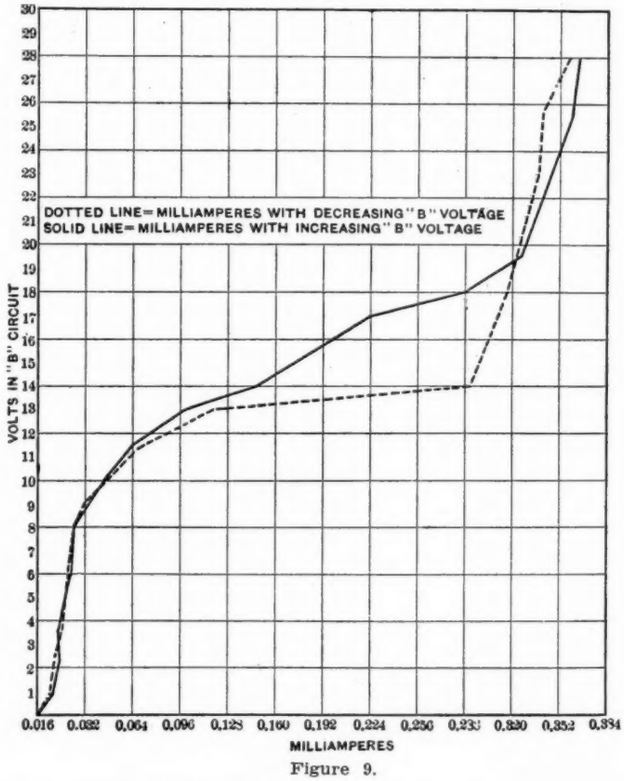

DOTTED LINE = MILLIAMPERES WITH DECREASING "B" VOLTAGE
SOLID LINE = MILLIAMPERES WITH INCREASING "B" VOLTAGE
VOLTS IN "B" CIRCUIT
MILLIAMPERES

Figure 9.

is found a point at which the flux if increasing assumes a sudden increase in magnitude, representing an abrupt rise in the otherwise smooth flux-voltage curve; and the reverse when the current flux is being decreased.

These effects seem to relate to the increased values of the positive variation layers along the vertical edges of the anode which parallel the filament. The distribution of the charge upon the surface of the plate may be described as analagous to that of a thin film of liquid which coalesces and is heaped up along the edges, and from which, when

the liquid is by any means drawn away, there is a sudden recession; the liquid, on account of the surface tension, letting go or taking hold of the edge all at once.

It is significant that just at a cusp point the sensitiveness of the Audion to the hertzian oscillations attains a marked maximum. Under the critical conditions then obtaining the slightest change in the applied electromotive force is accompanied by relatively great changes in the *B* flux.

In framing any theory of the action of electric oscillations in the Audion a variety of complex, contradictory phenomena are met with, exceedingly puzzling to explain. An example is the fact that a continuous-current instrument either in the *A* or the *B* circuit shows absolutely no change of deflection either of increase or decrease, when *B* is large and the Audion in its most sensitive condition. If only the popsitive halves of the oscillations pass from anode to filament these should increase the reading of a milliammeter in the *B* circuit during the passage of a long series of wave-trains of sufficient intensity. Or else the negative halves of these oscillations might be expected to diminish to a greater degree the positive charge on the anode, and result in a diminution of the *B* circuit. Or if both of these acted equally and oppositely no signal would be obtained at all, for the telephone diaphragm is utterly incapable of following such rapid increase and decrease in the *B* current, even if its impedance would allow these pulsations to pass through the circuit. Neither would the ear detect such vibrations.

If on the other hand the integrated effect of a complelte hertzian wave-train were either to increase or decrease the *B* flux, a long succession of such effects, all of which must be of the same sign, ought to cause a change in the needle's deflection, as when a long Morse dash is sent out from the transmitting station. We have no reason to suppose that one wave-train, the result of one spark, would produce a momentary decrease in the *B* flux, indicated by a click in the telephone, and that the next succeeding wave-train from the next spark would cause an opposite *increase* in the *B* flux, and another similar click in the telephone. Such action would of course explain why a loud sound in the telephone might not be accompanied by any change in the sluggish ammeter reading, similar to the case with the magnetic detector.

The following explanation of the phenomena which seems to account for many of the peculiarities of this paradox has been suggested. It should be remembered that if the negative half of the electric oscillation can not pass through the gas from cold anode to the filament the Audion electrodes during that half-period will act merely as the two armatures of a condenser. Even when close together, their mutual capacity, when the gas is cold, is exceedingly small, and only a very small positive charge can be held bound on the filament; or if there are sufficient free positive ions in the hot gap the complimentary positive charge will be held just on the outside of the "variation layer" at the anode.

The fall of potential across the variation layers at anode and cathode are proportional to the squares of the velocities of the positive and negative ions; and the ionic velocities are proportional to the electric forces acting upon them. Supposing then that during the positive half of the electric oscillations the velocity of the positive ions is increased at the anode layer, and during the other half period the velocity of the negative ions is increased, due to the changes in the electric force acting upon them. Then regardless of the sign of the change of the velocities the potential drop across the variation layers (which varies with the square of these changes) will be increased during the entire passage of the oscillation train.

The layer will act during this interval like a condenser, the potential drop across which is momentarily increased, which momentary increase will disappear with the passage of the wave-train. It will be as though the plates of a charged air condenser were suddenly further separated and then brought suddenly back to their normal positions; or as though the specific inductive capacity of the dielectric were decreased and then increased. This operation being repeated for every spark at the transmitter a listener in the telephone in the *B* circuit will hear a sound whose pitch is exactly that of the spark, while an ammeter in that circuit will show no variation in its deflection.

As the fall of potential across the variation layers is proportional to the square of the current passing and to that of the impelling electric force, it is readily understood how, by regulating the heating current and the *B* voltage, an optimum value of the electrode drop may be obtained for which the effect from any given received impulses will be a maximum. Also how by varying the distance between the electrodes the sensitiveness of response may be regulated.

Thomson states that the current between two plates for a given difference of potential varies inverseiy as the cube of the distance between the plates, up to the saturation-current stage. But in the case of the Audion, where the cathode is an incandescent filament, the law seems to be quite different. Thus for two anodes of equal area, one approximately four times as far from the filament as the other, the two currents were as 21 to 8. The flux here varies more nearly as the inverse distance.

The potential difference required to produce saturation is proportional to the square of the distance between plates and to the square root of the intensity of ionization. This latter depends on the temperature of the filament.

In the case of the parallel plates, only one of which is incandescent, or if both are heated but below yellow heat so that only ions of one sign (positive) are present and carrying the current, then this current as Thomson shows is:

$$i = \frac{9\,R\,V^2}{32\,\pi\,d^3}$$

where *R* is the velocity of the ion under unit electric force, *V* the potential difference, *D* the distance between the two plates. According to this formula the current varies inversely as the cube of this distance. But this formula will hold only when *R* is independent of *X*, which it will not be when the temperature through the space is not uniform. It holds also only for currents that are small compared with their saturation values, for the saturation currents depend not upon the velocity of the ions but upon the number of ions produced in unit at the surface of the hot electrode.

But in the case of the Audion with small potentials, the closer the electrodes are together the more rapidly will the *B* current increase as the potential drop is increased. The trajectories of the ion are shorter and they therefore undergo fewer collisions, reunions, and retardations when the electrodes are close together.

In an Audion where the anode is far from the filament the saturation current is not attained with the *B* voltages used with the Audion in wireless telegraphy. We sometimes have instead its inverse counterpart, a saturation voltage, so to speak. As shown in the curve, at potentials from 10 to 18 volts a slight potential increment is accompanied by a very large increase in flux. And within these limits the sensitiveness of electric oscillations may be a maximum. The cusp points when present are generally found near these points of inflection in the flux-voltage curves.

In some cases a remarkable lag or "creeping effect" is observed at this saturation stage. As shown in the curve, the milliammeter needle crept slowly up after *B* was raised to 14 cells, from 18 to 26 divisions. The current flux required something like 15 seconds in this instance to attain its full value. The filament in this case may have been undergoing some change which caused it slowly to discharge more and more corpuscles until that stage was

reached where the recombination of oppositely charged ions in the gas exactly equaled the output of negatively charged ones from the incandescent surface. Sometimes this creeping is accompanied by a loud frying sound in the telephone.

Thomson shows that at low gas pressures and high ionic velocities the ions, when placed in a strong magnetic field, will travel along the lines of strong magnetic force; but when the product of velocity and field is small the ion moves parallel to the electric force. If both magnetic and electric forces are uniform, the ions, both positive and negative, will move in the same direction and perpendicular to both E and H. When the electric field is not uniform but radiates from a point, and the magnetic field is uniform, the ion will describe a spiral traced on a cone of revolution whose axis is parallel to the magnetic field.

If the direction of E and H coincide, the path of the ion itself is a helix of gradually increasing pitch, with its axis parallel to the lines of magnetic force. The radii of the spirals will be small compared to the length of the mean free path of the ions. This is especially true for the negative ions, even when the motion of the positive ions is but little affected by the magnetic field.

If the electric field is not uniform (and it is not in the Audion where the negative charge is located on the small cylinder of the filament instead of on a plane surface) the paths of the ions will not be cycloids, but in any case the ions will be turned back by the magnetic field after traveling a certain distance d, from their source. Thus they will get further than d from their source.

When the lines of magnetic force are perpendicular to the discharge in the cathode-ray tube, the magnetic field at all pressure retards the discharge and diminishes to a considerable degree the great drop in the electric force which occurs in the negative glow.

In general it can be assumed that in a strong magnetic field the ions tend to follow the lines of magnetic force. The smaller the velocity of projection the more nearly does the path of the ion coincide with a line of magnetic force. In cathode-ray tubes the boundary of the negative flow may coincide with the lines of magnetic force.

In the case of the Audion if the lines of a strong magnetic field pass through the gas parallel to the plane of the anodes, a marked reduction in the flux is obtained, sometimes amounting to 20 per cent. This effect is greater when the south pole of the magnet is nearest that leg of the filament which is attached to the negative terminal of battery A. The negative charge on this leg is of course greater than on the other, for the negative charge on the other is the resultant of the negative potential of battery B and the positive potential of battery A. And when the lines of magnetic force are so directed as to tend to sweep some of the negative ions off from the parts of the anode nearest to the filament leg which carries the greater negative potential, the reduction of the flux across the gas will be the greatest possible. Hence the magnetic poplarity observed.

If the filament extend above the top of the anode, say for 0.5 cm., then a magnetic field parallel to the filament legs may tend to force certain ions into a downward trajectory so that they will strike upon the anode instead of passing off above it. In this case only is an increase in the B flux observed as a magnet is brought up to the Audion.

In general the flux will be diminished by the magnetic field. When the magnetic lines pass perpendicular to the plane of the wings the negative ions which are traveling in the direction of the magnetic force, from filament to wing, will be accelerated, but those originally traveling out from the filament in the opposite direction will be bent around or deflected from their direct paths; so the resultant will be a decrease of the total current flux.

When the field is intense, a marked frying or hissing sound in the telephone is heard, especially with the two-wing anode, and when the magnetic force is parallel to their plane and thus affecting mostly the ions which are streaming towards their vertical edges. In the hissing arc parts of the arc in rapid motion in the unstable portion around the edges of the positive terminal. Possibly also the presence of oxygen in the gas enters into the phenomena here as it does in those of the hissing arc. As the magnetic field lengthens the arc so here it lengthens the paths of the ionic discharge.

The hissing is much more violent when the surfaces of the anode instead of being plane are punched full of little holes whose ragged and protruding edges offer a greatly increased opportunity for the ions to travel irregularly under the combined forces of the magnetism and of the electric charges heaped up at all such points and edges. In this particular Audion I could get a great range of singing or squeaking sounds as the heating current was varied. Where the velocity of the ions is a maximum their deflections by the magnetic field will be lessened.

If the B flux is too great to give maximum sensitiveness of response, bringing up a magnet to the Audion will increase the strength of the wireless signals, because of the reduction of the B flux. Or if this flux be already below the optimum then the presence of the magnet may decrease the sensitiveness. This effect may be more pronounced for one wave-frequency than another, in which case the Audion can be attuned by regulating the magnetic field to which it is subjected.

Consider the case where the electric oscillations instead of being introduced into the Audion through its interior anode are brought up to a metal plate outside a vessel. Electric displacement currents instead of conduction currents must then act upon the ions within the vessel and on the charges upon the electrodes.

Now in the case of an electromagnetic wave, where H and E are perpendicular to each other and to the direction of propagation, Thomson shows that if the product of $H \times e$ is large (e being the electric charge on a carrier) the average velocity of the ion parallel to the direction of E is zero, and the wave will carry the ion along with it. When, however, $H \times e$ is small (no external magnetic field) the effect of the hertzian wave will be to superimpose on the undisturbed motion of the ion a small vibratory motion parallel to the electric force in the wave and thus perpendicular to its direction of propagation.

A very convenient form of Audion for investigating the relations which the distance, area, etc.. of the electrodes bear to its response is had by using a pool of mercury for the anode. This is conveniently held in one or more pockets blown in the walls of the glass vessel, and the filament so placed as to pass closer to some than to others.

Quite frequently I obtain with this arrangement two maxima of sensitiveness to the same transmitter, the filament heating current remaining unchanged; thus one maximum for $B = 12$ volts and a second for $B = 18$ volts. Again the sensitiveness is maximum when the mercury surface is as near as possible to the filament. When a globule has rolled out of its pocket, exposing a new surface for the anode, sometimes half a second elapsed before the sensitiveness is again restored. This form of mercury tube was especially sensitive to the influence of a magnetic field.

The optimum or critical voltage of B become less after this Audion has been heated a little time, as though the heated mercury vapor began to act to increase the conductivity of the gas. This critical voltage keeps reducing as the vaporization proceeds, and with a sudden jar on the tube I can bring this down, one cell of B at a time, accompanied by a loud click in the telephone at each reduction. Sometimes a similar reduction of the B flux amounting to as much as 25 per cent can be obtained with the double platinum wing type of Audion, by striking it smartly; or a sudden increase in the flux may be obtained.

The heating current when a large anode surface is used is less than that required to produce the same degree of sensitiveness with a small pool of mercury as anode. In general the flux is quite proportional to the area of the anode, other conditions remaining unchanged. A mercury arc also may be substituted for the filament, but such an arrangement is apt to be noisy in the telephone.

When the hertzian oscillations are passed through the filament instead of through the gas, they require to be of great intensity to give any response whatever. Any results from the added heating effect which they may contribute to the filament are quite insignificant. The response when the Audions are connected up in parallel, or series, is always less than for one used alone.

In a tube whose two-plane anodes are fitted on hinges and backed with small iron disks so that their distances from the filament can be regulated by an external magnet, I find the response to a long wave-length greatest when this distance is the greatest possible; while to a wave-length of about one-half this, the response is decidedly better when the wings are nearer to the filament. Of course the *B* flux is greater in this latter case, other conditions being unchanged; but the selective quality in this tube just described seems to be due to the regulations of the distance between anode and cathode rather than to other factors.

The manner in which the Audion should be located in the oscillating circuit, as well as many other considerations, show conclusively that it is a "potential-operated" rather than a "current-operated" relay receiver. At the same time its advantageous sluggishness of action, as explained above, renders it additive in its response to the energy of an entire wave-train or even of a series of wave-trains. Hence its excellent and marked selective qualities.

A large number of experiments have been carried out with a view to reducing the filament heat necessary to give the enclosed type of the Audion the extreme sensitiveness which now characterizes it. This is now attained at normal brilliancy of the filament, or a little below; never at excessive heats. Thus the life of an Audion should be that of an incandescent lamp of the same class of filament and voltage.

Filaments have been coated with alkali metals or salts, or vapors of these introduced into the tubes. Experiments along these lines and with various dissociable gases are being pushed with gratifying promise of our soon being able to achieve the present marked sensitiveness even at red heats; or of still further multiplying the sensitiveness.

Radioactive compounds, applied for example between juxtaposed metal disks and heated, give little encouragement. At the low voltages used no increase of conductivity by their means has been observed, although Swinton has found that a radium coated cathode in a cathode-ray tube has a marked action in facilitating a luminous cathodic discharge, when the cathode is heated to redness. The mere presence of radium in the tube is insufficient to produce the effect.

Spontaneous ionization, that is, the ionization independent of the electric field, as for example that produced by the X-rays, does not increase the current flux. Only the ions produced by the electric field itself close to the cathode, and by the heat of the cathode, is effective.

It is required that the Audion be made with scrupulous care; a trace of impurity in the gas may produce surprisingly large effects in the potential drop across the variation layer. The presence of a mere trace of moisture may cause great difference in the behavior of a tube.

In all this work a bewildering host of new and puzzling phenomena is continually encountered. By its nature clean and pretty, fascinating in its ever new phases, gratifying in the efficiency with which it responds to the difficult demands of a new and intricate art, the Audion combines infinitely delicate matter and forces, at once offering rich fields for study to the physicist and delight to the practical man.

TWO SYSTEMS.

The telephone business of the United States is represented by two systems, founded upon two separate and opposing principles as antagonistic to each other as good and evil, or light and darkness.

Monopoly is the very essence of one system, which is composed of one parent company and thirty-six subsidiary companies, says the Bulletin of the Indiana Independent Telephone Association. As the parent company owned the patents and all the essential appliances, as well as a majority of the stock of the subsidiary companies, it was in a position, before the rise of the Independents, to say who could go into the telephone business, what rate the public should pay for service, and to whom it would furnish service. Upon this principle it began business, parcelled out the entire United States to its subsidiary companies, and founded the Bell system.

Independent control by each company of its own affairs is the essence of the other system, which is composed of thousands of separate companies, each owning its own equipment, controlling its own stock, conducting its own affairs and charging service by mutual agreement. Upon this principle is founded the great Independent system.

That these two systems are irreconcilable, that if one succeeds the other must fail, is apparent to any one who will give the matter consideration. The companies composing each are the mere exponents of the underlying principle of their respective systems. The companies composing the Bell system must stand for monopoly and be opposed to Independent ownership as long as they remain a part of that system, and their very plan of organization precludes them ever getting out of the clutches of the system intact. It is not the individual corporations composing the Bell system with which the Independents have drawn swords. It is the system itself, and this conflict of opposing principles, as represented by these two systems, will continue until the Independent has overthrown the entire Bell system and freed not only the public but the shattered remains of the Bell companies themselves from the monopoly's grasp.

Such a conflict of opposing principles is not peculiar to the telephone business. This same conflict is going on in all commercial lines to-day, but the very principles of greed, disregard for the people's rights, abolition of competition and exorbitant profits, which are the essence of monopoly and upon which monopoly is founded, are also the very principles that ultimately will lead to its destruction. No monopoly has ever been more than temporarily successful.

It does not take a prophet to predict which of the two opposing telephone systems must finally win. In fact, so far as Indiana is concerned, it is no longer a matter of speculation or doubt, for while the Independent principle has been in operation only about ten years, yet the Independents have 400 separate companies and operate 200,000 telephones in the state, which is five times the number owned by the Bell in the same territory, although they have been in the field three times as long.

Independent ownership and operation of the extensive telephone interests is no longer an experiment, for there is no line of business to-day having more elements of endurance, permanency and success. Monopoly of the telephone business in Indiana has had its day and is a failure. The people made it so.

Sodhouses and telephones are the strange combination now offered by the prairies of western Kansas. The sodhouses are neatly and substantially built, while the network of telephones in the Kansas country overcomes the isolation of earlier days.

MANSON'S PRACTICAL SUGGESTIONS

A Series of Short Articles Dealing with Important Phases of Telephone Work

By Ray H. Manson

PORTABLE BATTERY BUZZER TEST SET.

ALMOST convenient testing instrument for locating ordinary exchange troubles is the battery buzzer test set. It is usually made in a very crude shape from several dry cells bound together with twine or tape, to which is attached a buzzer and the connecting wires. This modest arrangement answers the purpose for emergency use, but as a buzzer test set can be employed to great advantage in the every day work of the exchange it should be fitted out in a more permanent and convenient form.

One very good construction for this set is shown in Figure 20. The box is made large enough for four two and one-half by six inch dry cells known to the trade as No. 6 or telephone size. The buzzer is mounted at the top of the box and the testing tips with their flexible connecting cords are arranged at the side, while the complete set is made portable by adding a leather strap for a handle. One

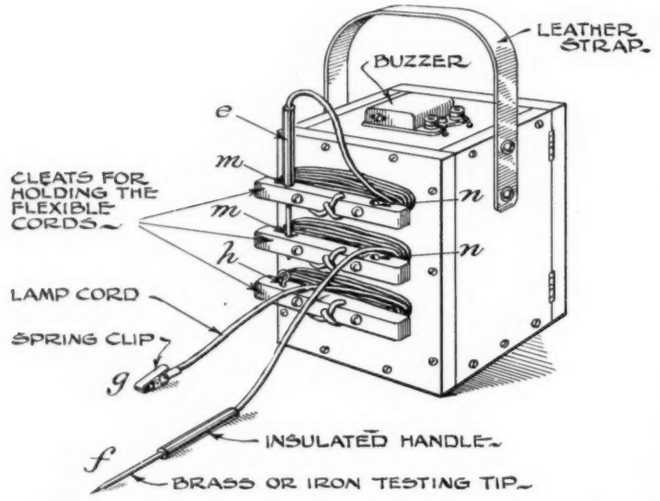


Figure 20—Portable battery buzzer test set showing a convenient arrangement for holding the surplus length of cord.

side of the box should be attached with screws or hinged so as to make the battery accessible.

Two hardwood cleats, shown at *B*, Figure 21, are provided for reeling up the surplus cord of this set, so as to keep it out of the way and prevent its becoming entangled when not in use. These cords are brought out from the inside of the battery box through holes *p*, in the reeling cleats, and fastened so as to relieve the strain from the inside connections by tying through the hole *s*, as illustrated at *C*. When the cords are reeled up, the testing handles can be conveniently retained by inserting their points through the holes *m* and *n* provided in the cleats for the same. This will prevent their accidentally coming in contact and ruining the battery when set is not in use.

A third cord with its reeling cleat and a spring clip *g* (Figure 20) can be provided and connected to the same portion of the buzzer circuit as the testing point *f*, for use instead of the latter when one person is employed in testing between widely separated portions of a circuit. The spring clip *g* can be snapped over the terminal or end of a wire of the circuit under test and the testing point *e* used at any distance from the former. A hook *h* can be provided in the lower cleat for holding the end of this testing cord when it is reeled up.

Regular lamp cord makes a most durable and pliable conductor to the testing clips, while an ordinary low wound buzzer, of about four ohms resistance, will serve as a sig-

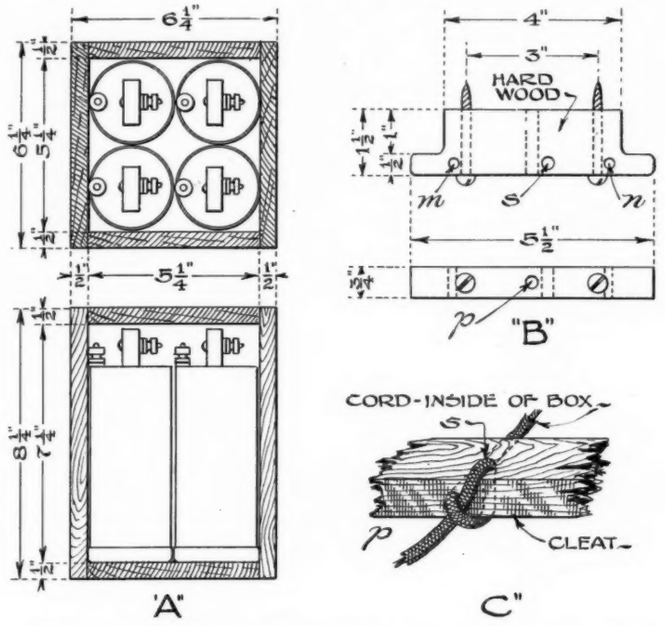


Figure 21—Details and dimensions of the portable battery buzzer test set illustrated in Figure 20.

nal. The dry cells and buzzer are connected in series, Figure 22, so that when the testing clips are touched together or to a low resistance closed metallic circuit, in testing, the buzzer will operate. It is obvious that the buzzer will not operate when the tips are connected through a high resistance path or open circuit, but within the range of its sensitiveness of action it will clearly indicate by the loudness of vibration whether the connected circuit is of high or low resistance. Furthermore, unlike a magneto test set, the

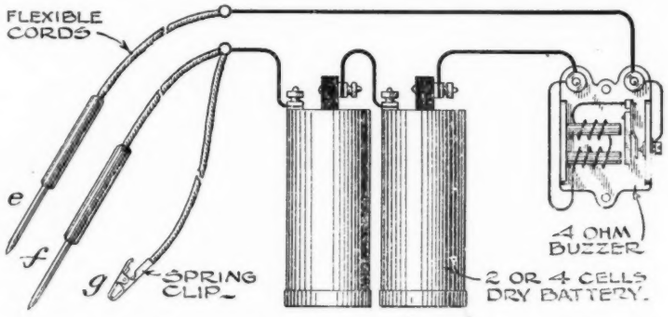


Figure 22—Battery buzzer test set circuit. Handles e and f are for regular testing and handle e and clip g are for use when testing at widely separated points.

presence of electrostatic capacity in a circuit under test has no effect on the operation of the buzzer so that its indications can be relied upon as correct.

The trouble man who is thoroughly acquainted with the possibilities of this simple test set makes use of it for locat-

ing practically all exchange troubles, such as opens, crosses and grounds in the circuit wiring, and the continuity of the circuit through the switchboard wiring or relay contacts, as well as determining whether the conductors of a switchboard are defective. The switchboard circuits can also be readily traced through the cables by its aid.

A more portable testing set, following the same design, but reducing the box dimensions, can be made by using the small or pocket size dry cells instead of the No. 6 cells.

TELEPHONE GROUNDS.

Too much attention cannot be given to the making of reliable grounds and ground connections at both the telephone exchange and the subscriber's stations. It is obvious that poor construction in this respect will render inefficient the very use for which the ground is provided, and what is of as much importance, a high maintenance expense will be incurred. This extra expense invariably pays for the better construction within a very short space of time.

There is a distinction between the ground for use at a subscriber's station and that for the exchange proper, as the latter is common to all of the circuits and must be made of sufficient carrying capacity to offer the minimum amount of resistance to the return signaling or talking currents. The individual grounds at the subscriber's stations, however, should be made with the same care but less surface contact with the earth is necessary, although the greater surface the better the results.

Another important fact which should not be overlooked

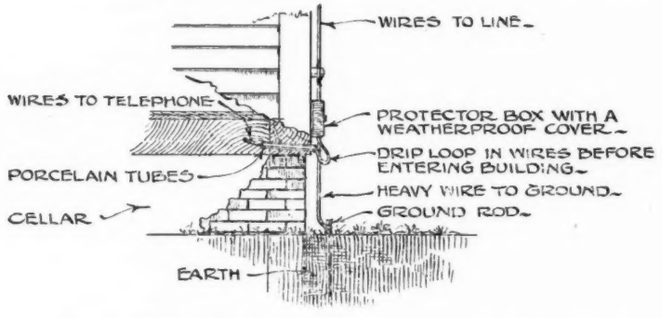


Figure 23—A sub-station ground connection. The heavy wire from the ground rod is attached directly to the arrester terminal, thus giving a short direct path to earth.

in installing subscriber's station grounds for return signaling circuits, is that each telephone, whether in the same building or not, should have its individual ground rod or an individual connection to the piping system in the building, when such a ground is provided. If this precaution is not taken, a slight increase in resistance of the earth contact, or connection joint with the piping system, will leave the several telephones tied together through their ringers and cross-talk and cross-ringing will result.

When the ground is to serve as a path to earth for static discharges such as lightning, it should be located outside of the building and the lead wire to the protector carried in as nearly a straight line as possible and all kinks, coils and sharp bends avoided. This is a requirement imposed by the National Board of Fire Underwriters for lighting and power circuits, and as it is founded on the fact that the majority of the lightning discharges take the shortest and straightest path to earth, it is a safe rule to follow in telephone construction. The construction adopted by some of the foremost telephone engineers is along this line, the protector being provided with a water-proof cover and located on the exterior of the building near the ground so that a short, straight connection can be made to the ground rod as illustrated in Figure 23.

The actual connection with the ground at the subscriber's stations can be made to a water or gas pipe, which is attached to the street mains and in service, or to a ground rod driven in permanently damp earth.

When the connections are made to pipes, preference is always given to water pipes, as they are less liable to be disturbed and have a larger surface contact. In every case, whether the ground is made to a water or gas pipe, the best place for connection is at a point between the meter and the street mains, as illustrated in the upper right hand

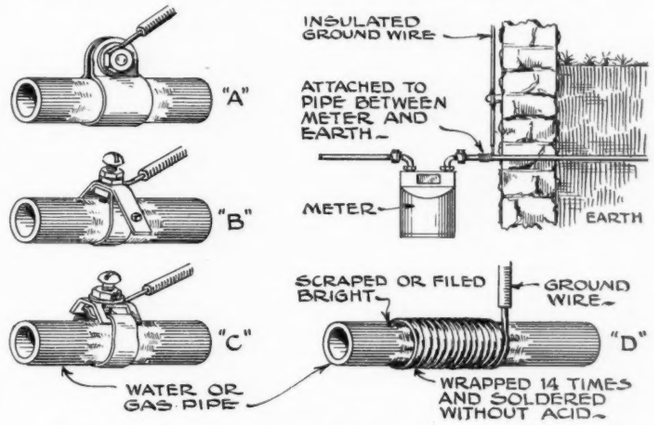


Figure 24—Ground connections to water or gas pipes. A, B and C are regular ground clamps, D is a soldered joint and the remainder of the illustration shows the best place to connect a ground wire to a piping system.

corner of Figure 24. This follows the rule that it is always advisable to have a ground connection to a pipe made as near as possible to the earth as troubles with the plumber are then avoided.

If, for any reason, this is impossible a precaution should be taken to connect a shunt around the meter so that in the event of its removal the circuit will still be complete.

Steam and hot water pipes have been found to be unsatisfactory ground connections and are seldom used except in large office buildings, where it is impossible to obtain any other better means, but in such cases it is necessary to have the piping system carefully grounded in the basement.

The mechanical and electrical connection of the ground wire to a pipe can be done in several different ways, the most common being through special ground clamps similar to those shown in *A*, *B* and *C*, Figure 24. Before these clamps are put into place, it is necessary that the pipe is carefully scraped or filed bright so as to insure a good metallic circuit.

A soldered connection to the pipe gives the most reliable

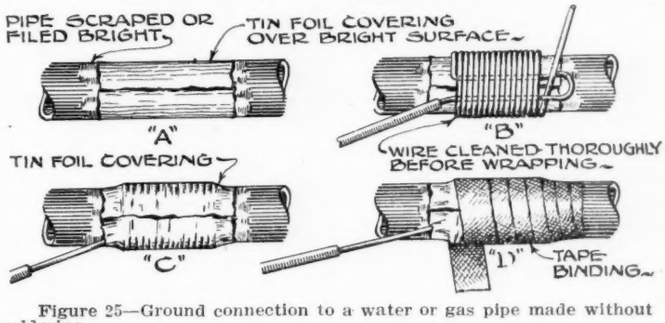


Figure 25—Ground connection to a water or gas pipe made without soldering.

construction, but it is rather difficult to provide. The pipe is first scraped bright where the joint is to be made and the surface tinned without the use of acid; resin or other non-corrosive flux being used. The insulation is then removed from the ground wire and its surface is also carefully cleaned by scraping, after which it is tightly wrapped around the pipe and thoroughly soldered to it, as illustrated at *D*, Figure 24, and in Figure 30.

A fairly reliable wrapped joint made without soldering

is shown in Figure 25. The pipe is first scraped and then covered with a layer of tin foil as shown at *A*. The ground wire, with its insulation removed for a length of several feet is now tightly bound around this prepared surface as at *B*, its free end being drawn under the turns of wire by means of a loop formed as illustrated. This keeps the turns of wire from loosening and does away with the necessity of soldering. To insure a good connection and prevent corrosion, another layer of tin foil is applied and the whole is covered with a binding of adhesive tape.

Another unsoldered joint is made by wrapping the wire around the pipe and clamping the whole in place by a metal clip similar to that shown at *A*, Figure 24.

A most permanent and reliable connection to a piping system is made by soldering the ground wire to one or more brass plugs, made to tightly screw into a pipe fitting, or if the pipes are of cast iron, into a hole tapped into the pipe itself.

When there are no piping systems present, to which the subscriber's station ground wire can be connected, recourse must be made to the standard ground rod, which consists of a pointed iron bar about one-half or five-eighths of an inch in diameter and six or seven feet long, shaped as shown in Figure 26. Smaller diameters and shorter lengths

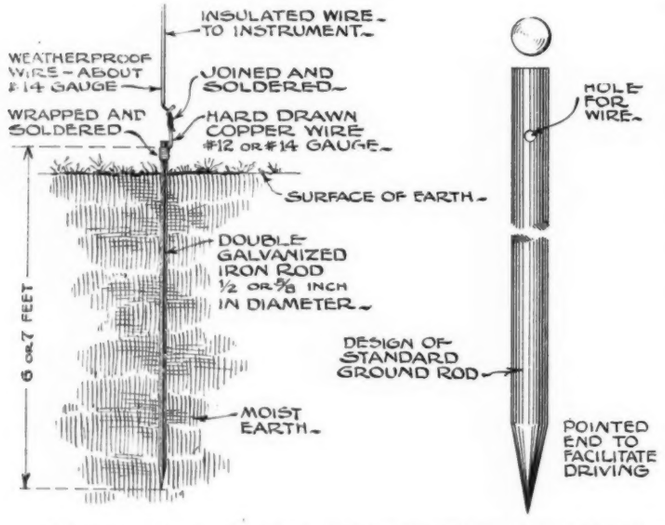

INSULATED WIRE TO INSTRUMENT
WEATHERPROOF WIRE—ABOUT #14 GAUGE
JOINED AND SOLDERED
WRAPPED AND SOLDERED
HARD DRAWN COPPER WIRE #12 OR #14 GAUGE
HOLE FOR WIRE
SURFACE OF EARTH
DOUBLE GALVANIZED IRON ROD ½ OR ⅝ INCH IN DIAMETER
6 OR 7 FEET
DESIGN OF STANDARD GROUND ROD
MOIST EARTH
POINTED END TO FACILITATE DRIVING

Figure 26—Design of a ground rod and method of attaching the ground wire. The short piece of heavy copper wire is soldered to the rod before leaving the exchange, thus allowing the installer to make a good joint with the ground wire from the arrester.

of rods are sometimes used, but as the carrying capacity depends on the surface in contact with moist earth it can be readily appreciated that a long rod with a large diameter is preferable. These rods are protected against corrosion by being thoroughly galvanized.

A very reliable fastening of the ground wire to the ground rod is made by inserting its end through the hole in the top of the latter and wrapping it several times around the rod, the parts then being carefully soldered. As this is a difficult feat to accomplish without the use of special tools, it is customary for the workman to first solder a piece of No. 12 or No. 14 copper wire to the rod before leaving the exchange, to which the ground wire can then be readily attached when the rod is installed.

The short copper wire is attached to the end of the ground rod by thoroughly cleaning the surface of the rod and tinning it with resin flux solder. The heavy copper wire is then cleaned, its end inserted through the hole in the ground rod and tightly wrapped around the body of the latter, to which it is carefully soldered by the aid of resin flux, as shown in Figure 30.

These prepared ground rods are installed by driving into permanently damp earth, after which the wire from the subscriber's station equipment is attached to the short piece of copper wire, extending from the ground rod, Figure 26, and then thoroughly soldered together so as to insure a good mechanical and electrical connection. The short piece of heavy copper wire serves a second purpose,

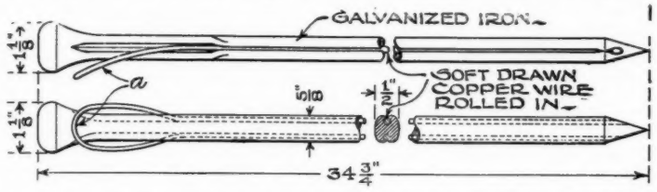


Figure 27—Removable ground rod used by the United States Signal Corps.

that of reinforcing the ground connection at the surface of the earth where the greatest amount of trouble is likely to occur.

The difficulty of driving a ground rod through the upper crust of hard earth can be greatly overcome by first making a hollow in the ground, filling it with water, and allowing it to stand for a short time so as to impregnate and soften the soil.

Figure 27 illustrates the construction and size of a ground rod used by the United States Signal Corps in connection with its portable generator call switchboards. The rod is made from galvanized iron of oval cross section, pointed at one end and provided with a head at the other end. This head is used to facilitate the driving operation and also to allow the rod to be readily withdrawn when the location of the telephone station is moved. A soft drawn copper wire loop *a*, Figure 27, is provided for attaching the switchboard ground wire. This wire loop is securely fastened to the ground rod by having its ends rolled into two diametrically opposite grooves, for nearly the whole length of the rod. Soldering to the ground rod is thereby avoided and a most durable construction is obtained.

It is very necessary that the character of the soil into which the ground rod is driven is such that the ground will be permanent. Dry earth, clay (even when wet), gravel

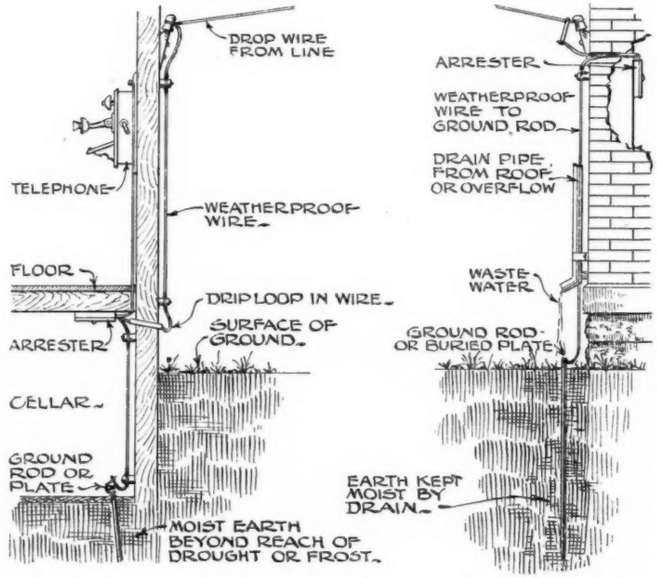


Figure 28—Locations of ground rods to assure good contact with moist earth. The wiring from the lines to the instruments are examples of the practice followed by some installers.

and rock sand are not good materials for grounds. Rich soil is the best as it is of low electrical resistance and will usually remain in this state continuously. Pure water has a comparatively high resistance, so that it is next to impossible to obtain a serviceable ground by means of a metal

plate resting on the bed of a mountain or fresh water stream.

Where permanent dampness cannot be had, water can be supplied to the ground through a pipe from some convenient source, as illustrated at the right hand side of Figure 28. The left hand side of this same illustration shows a construction which has proven very satisfactory. The ground is made in the rich earth under the basement floor

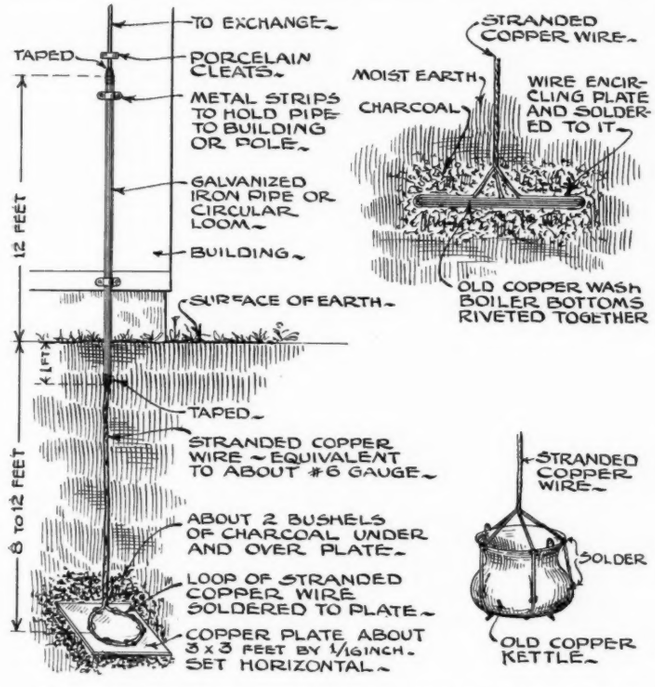

TO EXCHANGE
TAPED
PORCELAIN CLEATS
METAL STRIPS TO HOLD PIPE TO BUILDING OR POLE
GALVANIZED IRON PIPE OR CIRCULAR LOOM
BUILDING
12 FEET
SURFACE OF EARTH
4 FEET
TAPED
STRANDED COPPER WIRE ~ EQUIVALENT TO ABOUT #6 GAUGE
8 TO 12 FEET
ABOUT 2 BUSHELS OF CHARCOAL UNDER AND OVER PLATE
LOOP OF STRANDED COPPER WIRE SOLDERED TO PLATE
COPPER PLATE ABOUT 3 x 3 FEET BY 1/16 INCH - SET HORIZONTAL
STRANDED COPPER WIRE
MOIST EARTH
CHARCOAL
WIRE ENCIRCLING PLATE AND SOLDERED TO IT
OLD COPPER WASH BOILER BOTTOMS RIVETED TOGETHER
STRANDED COPPER WIRE
SOLDER
OLD COPPER KETTLE

Figure 29—Exchange ground made by burying a large copper plate in charcoal or coke below moisture level. The exchange ground also includes a connection to all available piping systems.

of a building and is thus out of reach of both drought and frost.

The large surface contact necessary for a central office ground is usually obtained by burying a copper plate (tinned for best result) having at least eighteen square feet exposed. In order that this plate will have sufficient me-

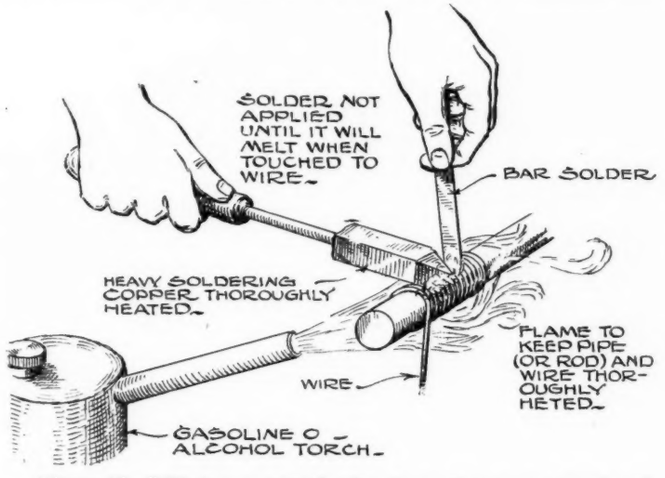

SOLDER NOT APPLIED UNTIL IT WILL MELT WHEN TOUCHED TO WIRE
BAR SOLDER
HEAVY SOLDERING COPPER THOROUGHLY HEATED
FLAME TO KEEP PIPE (OR ROD) AND WIRE THOROUGHLY HETED
WIRE
GASOLINE OR ALCOHOL TORCH

Figure 30—Soldering a ground wire to a pipe or a ground rod. The torch keeps the parts hot while the solder is spread with the heated "iron."

chanical strength, its thickness is made about No. 16 B. & S. gauge.

The ground wire extending to the plate is made up of several strands of copper wire, at least equivalent to No. 8 or No. 6 B. & S. gauge wire (preferably as large as No. 0) in carrying capacity. This stranded wire is more pliable and less liable to become defective than a single wire.

The lower ends of this stranded wire are thoroughly cleaned and soldered to the copper plate in several places, also made mechanically secure by riveting if possible; while the upper portion of the strand is passed through the iron protecting pipe to the exchange, as shown in Figure 29. This copper wire should be mechanically attached and soldered to the iron pipe at both ends of the latter, so as to be a part of the circuit, otherwise a retardation effect is liable to be caused which will interfere with the free passage of electrical discharges. Several large operating companies make use of Circular Loom or Flexduct (a non-metallic conduit) in place of the iron pipe, for this reason.

Serviceable central office grounds are made by using old copper kettles or old copper wash boiler bottoms, several of the latter being riveted and soldered together to make the necessary large surface. The ground wire is attached to this metal surface shown in Figure 29.

A loose coil of bare copper wire (a length of about 100 feet) is sometimes used with good results in place of the copper plate for an exchange ground. It is buried and treated the same as the plate.

Extreme care should be taken in locating a telephone exchange ground to see that the plate is buried below the permanent moisture level, which should be found at a depth of from eight to twelve feet. The ground plate is surrounded by moisture retaining material, such as crushed charcoal or coke (pea size), about two bushels being necessary for the size of ground plate previously described.

In addition to grounding the central office equipment to a buried ground plate, connection should also be made to all pipe systems located in the exchange building. A large capacity stranded and insulated cable or a large insulated wire (No. 0 for best results) is used for making this connection to the pipe, the joint being wrapped and soldered, as shown in Figure 30.

TELEPHONE BANQUET AT BELLEVUE, OHIO.

The Local Telephone Company of Bellevue, Ohio, gave a banquet to its stockholders on November 17, which was a most pleasant and enjoyable affair. Invitations were extended to every stockholder and they number over four hundred, scattered all over northern Ohio. Nearly three hundred accepted invitations. In addition to the stockholders, a number of men prominent in the telephone world were present as guests of the company.

Each guest found at his or her plate a neatly bound copy of the book entitled, "A Fight With An Octopus," written by Paul Latzke and published by TELEPHONY. It tells in graphic style the struggle of the Independent telephone companies against the giant monopoly—the Bell company and the final triumph of the former. Each guest was also presented with a statistical report of the Ohio Independent Telephone Association giving the number of Independent and Bell telephones in use in each county in the state.

Dwight E. Sapp of Mount Vernon acted as toastmaster and responses were made by the following gentlemen: F. A. Knapp, "The Local Telephone Company;" James B. Hoge, "The International Association;" Frank L. Beam, "The Ohio Association;" James S. Brailey, Jr., "Telephone Investments;" Hubert Wright, "The Rural Telephone."

The Local Telephone Company, whose general offices are in Bellevue, has enjoyed a prosperous career and a phenomenal growth.

The officers are as follows: Frank A. Knapp, president; J. P. Ruffing, vice president; Fred Wolfrom, secretary; J. H. Beattie, treasurer. The directors are C. R. Callaghan, J. H. Beattie, James Verdin, G. A. Wright, Frank L. Beam, J. P. Ruffing, R. T. Hearson, William Hess, Dwight E. Sapp, Fred Wolfrom, Frank A. Knapp.

TELEPHONE CONSTRUCTION PRACTICE

An Article Dealing With Guys and Messengers

By H. J. Minhinnick

THE stringing of the messenger strand should follow closely on the guying, and, before going into details of methods, etc., it will be appropriate to direct attention to the material itself. Ordinary strand is composed of seven single galvanized steel wires twisted together and of the following sizes:

For 5/16″ strand seven No. 12 wires.
For 3/8″ strand seven No. 11 wires.
For 7/16″ strand seven No. 10 wires.
For ½″ strand seven No. 8 wires.

The weights per thousand feet are 210, 300, 370 and 510 lbs. respectively, and the average breaking strains 3,300, 4,700, 6,000 and 8,320 lbs. It will be understood that these weights and breaking strains are averages, as both may vary considerably even in the same reel, the weight depending somewhat on the length of the lay of the strand and the breaking strain on both the quality of the individual wires and the degree of tightness to which they are twisted, the twist causing the wires to have a tendency to nick, which renders the breaking strain of the strand only about one-half that of the individual wires. Thus a No. 12 steel wire has a breaking strain of 933 lbs., which would give for the seven wires of the five-sixteenth inch strand 6,531 lbs., which is reduced by the causes mentioned to 3,330 lbs. as in the above table. The writer has had samples of strand tested to destruction which showed breaking strains from 7,800 to 9,100 lbs. for one-half inch in the same shipment, and considerable variations in the same reel.

Special strands of double the foregoing strength are to be had, and, in some cases, are to be preferred owing to the possibility of using smaller sizes and correspondingly lower weights to obtain the same strength which is, after all, the chief desideratum. Double galvanizing can also be had if desired. The chief objection to the high strength strands is the excessive hardness of the wire, which renders it a matter of great difficulty to make them up around a pole or anchor. Many of the best exchanges both Independent and Bell use double galvanized Siemens-Martin strand, substituting the five-sixteenths inch, which breaks at 4,860 lbs., for the ordinary three-eighths inch, and three eighths inch breaking at 1,000 lbs. for the seven-sixteenths inch or one-half inch. So far as cost is concerned, there is practically no difference between the two—that is, a five-sixteenths inch Siemens-Martin costs about the same as a three-eighths common and the double galvanizing adds largely to both the appearance and durability of the strand.

Whatever kind be used the galvanizing should be smooth and well applied, and all double galvanized wire should comply with the following specification: "The wire must be well galvanized and capable of standing the following test: The wire will be plunged into a saturated solution of sulphate of copper and permitted to remain one minute (this is now increased to seventy seconds) and then wiped clean. This process will be performed four times. If the ware appears black after the fourth immersion, it shows that the zinc has not been all removed, and that the galvanizing is well done, but if it has a copper color, the iron is exposed, showing that the zinc is too thin." This specification covers the thickness of the spelter, but it omits what is at least as vital—the bending of the wire without cracking the galvanizing or causing it to peel. As the superintendent of one of the largest mills in the country once remarked to the writer, "If we put on enough metal to absolutely stand the specified test it will crack when the wire is bent, and if we wipe off enough to stand the bending, the galvanizing requirement cannot be complied with." The remedy seems to be the use of a high grade spelter, and it is possible to produce a wire that will at least conform to the British postoffice specifications, which call for four one-minute immersions, and that a wire weighing 200 lbs. to the mile (No. 11 B. W. G.) shall bear bending around a bar one and one-half inch in diameter without any signs appearing of the zinc cracking or peeling off. As a matter of practice the writer prefers a wire that can be spliced in the usual way without peeling the zinc to one that will more than comply with the Western Union specification, but which will shed its galvanizing at every joint. In making this test warm water should be poured upon a quantity of commercial sulphate of copper (blue vitriol) in a glass jar or dish and well stirred; it is then allowed to cool to the temperature of the surrounding air and settle, the result being a "saturated" solution. The water will dissolve only a definite quantity of the sulphate, so there is no danger of making the solution too strong. The wire to be tested is cut into convenient lengths—say 12 inches—and wiped clean with a soft cloth; it is plunged into the solution and allowed to remain the exact time called for by the specification, quickly withdrawn and immediately wiped dry and clean with a soft piece of cotton, which process is repeated until the required four immersions have been made. After the last immersion any copper color appearing on the wire shows that the galvanizing is too thin.

The first thing necessary is to determine the size of messenger to be used and as this depends entirely on the weight of the cable to be supported the cable map will enable the office force to compile the order without trouble. Using ordinary strand the following practice will be found to give an ample factor of safety:

For 25 and 50 pair cables, ⅜″ strand.
For 75 and 100 pair cables, 7/16″ strand.
For 125 pairs and larger, ½″ strand.

A 25-pair cable will weigh 753 lbs. to the thousand feet, and in a one hundred and twenty foot span a three-eighths inch messenger will support a weight of 1,266 lbs. per thousand feet, with a safety anchor of two, taking no account of the self-supporting qualities of the cable, which raise the factor to at least six and probably higher. This with a deflection of 1 per cent or 1.2 feet. As a matter of fact, a lighter messenger than three-eighths inch would support the small cables, but it is unusual to go so far into the matter, and this is the smallest size of strand usually considered. It will, of course, be understood that if the higher grade strands be used the sizes will be correspondingly smaller.

Strand is furnished on reels holding 5,000 feet or less, and the manufacturers, for some inexplicable reason, send out the one-half inch on reels with a square hole in the center, thus necessitating the use of a square timber dressed to fit the hole and bored lengthwise to accommodate the shaft on which the reel is to turn.

The first step in the installation of messengers is, naturally, the placing of the supports, and this work should be

entrusted to none but thoroughly competent and experienced linemen. It goes without saying that all messengers should run in as nearly a straight line as possible, and that the ideal place on the pole is just below the fifth gain. It is often impossible to locate the messenger just as one would desire, but if the poles have been judiciously set, there should not be much difficulty. Each lineman being furnished with a brace and a nine-sixteenths inch bit, not less than fourteen inches long, the foreman sights along the lead from the terminal pole and lines up each hole so as to keep his grade. When all are lined up the holes are bored and the supports put in position but the bolts not tightened more than "finger-tight". The process is continued in the same way until all are set, it being desirable to use not less than five or six linemen at this work so that there will not be a multiplicity of short sights. The foreman should be thoroughly experienced in cable work, as many cases will arise where the proper placing of supports becomes a matter of importance. When the supports are set the messenger crew place the reel of strand on its horses at one end of the lead and, the men working from pole to pole with hand-lines, the messenger is drawn into position. An adequate crew for this work will consist of a foreman, four linemen, three groundmen and a team and wagon. It is the writer's practice to use a fairly long running line, say five hundred feet, which is first put in place by use of short hand-lines, and then attached to the wagon so that the team may pull in the strand. In this connection it may not be out of place to say that whenever a horse or machine can do a certain piece of work it is sheer folly to have it done by men. The only danger attending the stringing of messengers is the possibility of fouling high tension circuits and many fatal accidents have been caused in this way. A loose messenger will sag almost to the ground on a one hundred and twenty foot span, and the best, in fact the only, way to prevent such accidents is by a hand-line strung from pole to pole across such circuits with several hay carrier pulleys attached to it, the running line being passed through the pulleys on the ground and the whole then raised into position.

When the messenger reaches the final pole it is there made up exactly as a guy with Crosby and 3-bolt clamps, it being customary, in first-class work, to use two clamps in addition to the Crosby. The messenger is, of course, made up around the shims or strip already placed for the guy. Returning to the reel a sling is put around the terminal pole and a pair of eight inch blocks attached to the messenger and sling, to the messenger by any appropriate device, and to the sling by the hook of the block itself. Every crew handling strand should be provided with one or more slings made from one-half inch strand with an eye at each end and long enough to pass around the largest pole with a couple of feet to spare. When the blocks are attached as stated the crew take up as much slack as possible and hold it while the strand is cut to the desired length, passed twice around the pole and fastened by a Crosby clip; this puts the strand in proper shape for its final tightening.

Some difference of opinion exists as to the tension at which messengers should be drawn, many engineers claiming that they can not be pulled too tight, others that they should be given considerable sag. Personally the writer inclines to the former view, as no matter how tightly the messenger be strung, there will be a very marked sag when the cables are in place, and an exaggerate dip between poles always look slovenly and unworkmanlike. However, like many other points of detail, this is a matter of personal preference, and in no wise benefits or hinders the operation of the plant.

There are two methods of taking up the final slack, one by placing a sling around the pole, pulling up the slack as hereafter described and afterwards tightening the free end; the other by attaching the blocks by two clamps, one on the messenger, the other on the free end and drawing the slack around the pole. The writer has tried both methods and finds the latter much more speedy and efficient. The blocks being clamped as stated, a light strain is taken and the Crosby loosened; a second pair of eight inch blocks is whipped to the fall of the first and the team hitched to the fall of these; the strand can then be pulled to any desired degree of tightness. In this work none but the very best ropes and blocks can be used, and if there is the slightest doubt as to the quality of either, the work should not be attempted. The writer has seen two or three nasty accidents caused by attempting the enormous strains necessary with inadequate tackle; in this work above all others the blocks must be fitted with safety links so that the hooks can not straighten out. It will be found advisable also to attach a heavy line to the messenger outside the outer clamp and take a turn or two around a convenient pole so that in case anything should break the slack can be held or at least prevented from running very far back; it would seem hardly necessary to add that all men *must* be called down from the pole before the final strain is taken. When the foreman is satisfied that he has pulled sufficient slack (which he determines by sighting along the messenger) the strain lines are made fast, the Crosby driven as close to the pole as possible and tightened, the two three-bolt clamps put on ahead of it and the strain cautiously released. All that now remains is to place the messenger in the clamps and screw them home.

If the terminal pole be guyed by a stub and anchor it is most excellent practice to dead-end the messenger at the stub instead of on the cable pole, thus avoiding an extra guy, releasing the cable pole from all strain and also doing away with a cumbersome lot of strand on the pole which might interfere with the neat placing of the riser cable. It is also good practice to dead-end the messenger one pole ahead of the far terminal for the same reasons. As the guy stub will be hardly so high as the messenger, eye-bolts should be used on the two cable poles instead of the regular clamps; the manufacturers make a special clamp for this purpose with a rounded seat, but the eye-bolts make a neater and stronger job; they are made of one inch iron with a small eye and fitted with two cast washers, one on each side of the pole; they are usually ordered from a local blacksmith or machine shop and one size only will be required if all are ordered with six inch threads.

If two messengers be required they may be placed one on each side of the pole, or one above the other as preferred, the former practice being perhaps the better and certainly the more economical, as one bolt will hold both supports. In this case both messengers will be pulled before the supports are tightened; if the messengers are placed one above the other they must be separated by at least fourteen inches, as otherwise difficulty will be found in the cable installation due to the upper line sagging.

Where, for any reason, a pole carrying messenger has been set off the line an angle iron bracket is required to preserve the alignment. All such brackets must be specially ordered and should be measured exactly, allowing two inches more than is actually required, so that the messenger will strain toward the pole and so counteract the opposite strain of the line wires. The upper limb of the bracket is bolted through the pole, the lower attached by a lag screw; the messenger supports may be bolted either to the top limb, or to the inclined leg.

The last point requiring mention is that, on a curve, the messenger should invariably follow the inside and be run through eye-bolts; it may be laid down as a principle of universal application that a cable must never be permitted to rub against pole, cross-arm or anything else, and it is plainly apparent that in going around the outside of the pole on a curve it is bound to lie in contact with the pole.

INDEPENDENTS INVADE MILWAUKEE

After a Long and Strenuous Fight the Council Grants an Independent Franchise by a Vote of 45 to 1

By E. M. Rothelle

THE common council of the city of Milwaukee, Wisconsin, granted a franchise to the Milwaukee Independent Telephone Company on November 12, by the overwhelming vote of 45 to 1. Within five minutes of the announcement of the favorable vote, Mayor Sherburn M. Becker had affixed his official signature to the ordinance, giving it immediate effect, and the long, hard fight of the Independent telephone interests to gain an entrance to Milwaukee was won. It was an important victory for the Independent movement. The Bell monopoly had fought the ordinance creating competition with every means at its disposal. In fact, the reason Mayor Becker approved the measure so speedily was for the purpose of forestalling a restraining order which it was reported the Bell combine hoped to obtain from the courts preventing the signing of the ordinance at the last moment. As it stands now, however, the Milwaukee Independent Telephone Company is the possessor of a franchise, and is planning to spend $2,250,000 to $2,500,000 on a plant that will be in operation within twenty months and supply 20,000 subscribers with first-class telephone service.

The officers and directors of the company which will introduce an Independent telephone system into Milwaukee are:

President, H. D. Critchfield, Milwaukee, of the Consolidated Telephone Company of Buffalo, N. Y.; vice-president, E. A. Wadhams, Milwaukee, president of the Wadhams Oil Company; vice-president, J. S. Van Nortwick, Appleton, president of the Appleton Paper & Pulp Company, and president of the Fox River Valley Telephone & Telegraph Company; secretary, Clifford Arrick of Indianapolis, Ind.; treasurer, Howard Green, Milwaukee, president of the Fidelity Trust Company, and president of Jerman, Pflueger & Kuehmsted Co.; directors, Capt. John M. Baer, Appleton, general manager of the Fox River Valley Telephone & Telegraph Company; W. W. Cargill, LaCrosse, president of the W. W. Cargill Co., grain elevators, and vice-president of the La Crosse Independent Telephone Company; Chas. J. Chapin, Milwaukee, president of the Flint Mill Company, and a member of the firm of Chapin & Company; J. C. Harper, Madison, president of the Dane County Telephone Company; B. G. Hubbell, president of the Consolidated Telephone Company of Buffalo, N. Y.; Alvin P. Kletzsch, Milwaukee, secretary of the C. F. Kletzsch Company; Geo. P. Mayer, Milwaukee, president of the F. Mayer Boot & Shoe Company; Wilmer Sieg, Milwaukee, of Grossenbach & Company, commission merchants; Richard Valentine, Janesville, president of the Rock County Telephone Company, and president of the Wisconsin Independent Telephone Association; Richard G. Wagner, Milwaukee, president of the Wisconsin Sugar Company; J. B. Whitnall, Milwaukee, president of the Pennsylvania Coal & Supply Company.

Hon. Sherburn M. Becker, Mayor of Milwaukee.

As is the case with all Independent telephone companies, the Milwaukee concern which has achieved this notable victory over monopoly, is controlled by local men, every officer and director living at Milwaukee or in a Wisconsin city which in time will be reached by the Independent system. The granting of the franchise means that Milwaukee will soon be connected with 45,000 Independent telephones throughout the state which have hitherto been shut off by the close corporation policy of the Bell monopoly. In time, as the Independent systems are extended, Milwaukee will be in touch with all the anti-monopolistic lines throughout the country.

When President Critchfield began a crusade for an Independent franchise in Milwaukee he was subjected to unwarranted attacks, but his determined efforts and unswerving loyalty to the movement carried the day and he deserves much credit for the successful result of the fight, as, indeed, does every man connected with the enterprise. Speaking of the Milwaukee triumph, President Critchfield says:

"There have been repeated efforts made to secure favorable action from the city authorities by Independent concerns within the past six years, but all these efforts have been unsuccessful until the present action of the Milwaukee council.

"I came to Milwaukee last spring, and in April incorporated the Milwaukee Independent Telephone Company with a nominal capitalization of $100,000, and introduced an ordinance in the common council on April 30, 1906. The organization of this company was perfected in June. It is composed of thoroughly representative men of Milwaukee, and representatives of the larger Independent telephone interests in the state of Wisconsin. Our ordinance and two others were considered by the common council from the

time of their introduction either in committee or by the whole council, until the passage of the ordinance of the Milwaukee Independent Telephone Company on Monday, November 12th. The present common council of Milwaukee is composed of forty-six members, and as a whole is far above the average common council for intelligence and integrity. This telephone matter had full and careful consideration and by an overwhelming vote of forty-five to one our ordinance was passed. Mayor Sherburn M. Becker was standing at the clerk's desk, pen in hand, while the roll was being called, and immediately upon the vote being announced the president of the council signed our ordinance and it became a law. The council and mayor responded to an overwhelming public sentiment in favor of telephone competition in Milwaukee."

Hon. H. D. Critchfield, President Milwaukee Independent Telephone Company.

As to the plans of the company Mr. Critchfield says:

"This company is backed by the Consolidated Telephone Company of Buffalo. It is our purpose not only to develop Milwaukee at the earliest practicable time, but to develop other points in Wisconsin which are now occupied by Independent concerns. We also propose to extend and develop the long distance business in this state. In all of this work we will co-operate with existing Independent properties. As to toll line development, we will complete connections with lines of the Tri-State Telephone Company, which now reach down to La Crosse in this state, and we hope at no distant day to connect with the lines east through one of the Independent companies now seeking entrance into Chicago. Owing to the fact that Milwaukee and Chicago have both been closed to Independent telephone interests, the development in Wisconsin has not been as general as in many other states, there being approximately 45,000 bona fide Independent telephones in this state, including exchanges at Appleton, Green Bay, De Pere, La Crosse, Madison, Janesville and Racine.

"The Wisconsin Telephone Company is operating approximately 45,000 telephones in Wisconsin on its own lines, of which approximately 17,000 are in Milwaukee. In addition to these, they have leased to former Independent companies in this state about 23,000 telephones; these being operated by the so-called Independent companies on their own lines, under some sort of a rental arrangement with the Wisconsin Telephone Company. This arrangement is for a short time only, running from one to three years. Many of these organizations will gladly return to the Independent fold when they have a Milwaukee connection. It can thus be seen that the development of Wisconsin by the Wisconsin Telephone Company has been very tardy and meager. Wisconsin is a wealthy state, containing a very large number of small towns and villages, with well-to-do people, and an unusually large percentage of thrifty farmers. The opportunities for development are excellent.

"Our plans contemplate the immediate installation of 16,000 lines capacity from one central building, capable of being increased indefinitely; all cable distribution, modern construction throughout, using some one of the types of automatic apparatus.

"Our rates range from $60.00 for unlimited business service to $24.00 for four-party line unlimited residence service, with a four-party line measured residence service, 500 calls per year, or 42 calls per month, for $15.00 per year, with 3 cents per call in excess of 42 calls per month. Our rates will average about 35 per cent less than the present Bell rates for like service. We feel confident that with this reduced charge and modern service we will be able to install at least 30,000 telephones in Milwaukee. This high percentage will be partly due to the fact that there is less squalor and more thrift in Milwaukee than in any city of its size in the United States. Wages are good and every one is employed. From an estimate made by our engineers there are more than 15,000 homes in Milwaukee ranging in cost from $3,000 to $20,000 which have no telephone. We expect to begin construction work within sixty days, and push it as rapipdly as conditions will permit. We will increase our capitalization to a sum sufficient to meet the cost of initial installation and future requirements. Milwaukee now contains a population of approximately 330,000 people, with an assessed valuation for taxation for 1906 of more than $200,000,000.

"I feel much gratification over the result here, as Milwaukee has withstood the efforts of Independents for so long a time. This is about the last large city and any considerable adjacent territory unoccupied by Independent telephone lines in all the middle west, and I feel that the development of Milwaukee and adjacent territory will give an additional impetus to the Independent efforts in Chicago."

Only two changes were made in the ordinance when it came before the council for final action. One was an amendment providing that the company shall keep a record of its business and that it shall rebate to the city of Milwaukee all net earnings above ten per cent. This amendment also carried a proviso that the company each year shall submit its books to a committee of three to be selected from the three major political parties, and that if there be

but two such parties the mayor of the city is to be the third member of the auditing committee. The other change was in the shape of an amendment providing that the company install automatic apparatus.

Construction work will begin within sixty days, and as soon as operations commence solicitors will be put in the field to obtain subscribers. Plans have been completed for the plant and provide for everything on a first-class scale. Roughly speaking, there will be fifty-four miles of underground conduits. The entire plant will be housed in one building, and there will be but one central, having, at the outset, not less than 16,000 lines, which, with the installation of party lines will enable the company to serve in the neighborhood of 28,000 subscribers. It is expected the Independent company will start with about 20,000 patrons, and that within two years of its birth will be supplying 30.000. Plenty of capital is available for the financing of the enterprise, as many of the leading business men and capitalists of Milwaukee are ready to furnish the means. Some of the men interested in other companies seeking a franchise have been given the privilege of participating in the underwriting of the Milwaukee Independent Telephone Company. With this understanding, they decided to withdraw from the fight, with the result that the vote in the council was practically unanimous, and assures the hearty co-operation of all interests in the success of the Milwaukee Independent Telephone Company.

The first material benefit that Milwaukee will reap from the installation of the Independent company is expected to be a superior telephone service at lower rates. Next will come the connection with the thousands of Independent telephones throughout Wisconsin which are now cut off from Milwaukee, and which for that reason now divert much business to Minneapolis and St. Paul from the northern part of the state which should come to Milwaukee. There will also be harmonious co-operation with all the Independent telephone interests in Wisconsin. Already conferences have been held with regard to building trunk lines across the state connecting Milwaukee with every important commercial and industrial center in Wisconsin. Plans have been mapped out for the growth and development of the Independent business in various sections of the state. The very fact that Milwaukee is to have an Independent exchange will mean a great impetus to the Independent telephone business all through the state. Besides the connections outside the state, in time, will bring Milwaukee and Wisconsin into close communication with the 190,000 Independent telephones of Indiana, the 245,000 in Ohio and the entire network of Independent systems whose range is increasing day by day.

An important feature of the Milwaukee victory is the fact that it will supply the Independent link connecting the east with the west. There is now a territory about 175 miles long, from Chicago to Appleton, and about fifty miles in width, which is shut out of the Independent telephone business. but this will supply the necessary base for all the Independent telephone business in Wisconsin and form a portion of the connecting link between the east and the west. Independent lines are now built up to within about sixty miles of Chicago on the east, and to within about fifteen miles on the west.

DIGEST OF TELEPHONE PATENTS

By Edward E. Clement

833,733. Telephone System; Dean. In this system a consequent pole relay serves the purpose of a cut-off and a line signal relay. There are two windings, one of high resistance and the other low resistance, both having an equal number of turns to produce equal field forces. When a call is made current passes serially through both windings, but when a call is answered by the operator provision is made to shunt the high resistance winding so that if a consequent pole is formed it will be displaced so that the armature will not be attracted. Patent assigned to Kellogg Switchboard & Supply Company.

833,745. Telephone Transmitter Arm; Loff. This patent shows a hollow transmitter arm and a supporting base all stamped out of sheet metal. Patent assigned to Kellogg Switchboard & Supply Company.

833,778. Fastening Device for Switchboard Connecting Cords; Craft. The operator's connecting cord of this invention has a separate supporting or fastening cord which is attached to a peculiarly shaped clip carried by the operator's boards. Patent assigned to Western Electric Company.

833,816. Telephone Signaling Apparatus; Wray, Gardner & Kinton. A pole changing device is used in this system for selecting and a key is used for operator and controlling the operation of the pole changer and an electromagnet is used for reversing the circuit connection of the generator with the line conductors. Patent assigned to American Telephone & Telegraph Company.

833,817. Telephone Switching and Signaling Apparatus; Wray, Gardner & Kinton. In this system, which is similar to that just above described, a resistance is interposed which prevents the operation of the pole changer or when either of two stations on a party-line is connected. Patent assigned to American Telephone & Telegraph Company.

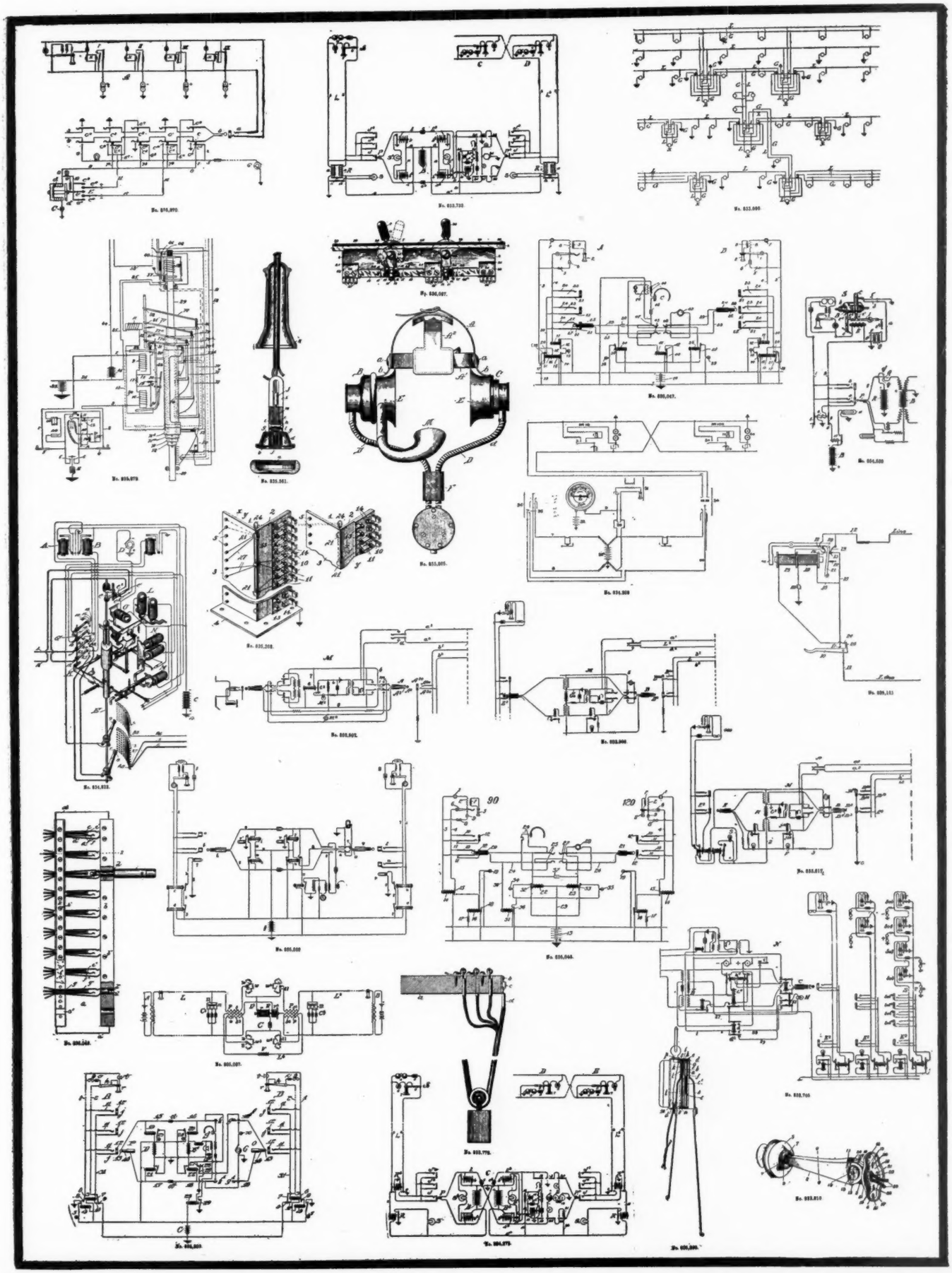
833,866. Telephone System; Beaver. In this system the regulating and proportioning of the inductive and ohmic resistances play an important part. Any two or more lines may be connected together indiscriminately without regard to the kind of line. Patent unassigned.

833,906. Telephone Switching and Busy Test Apparatus; Wray, Gardner & Kinton. This system is very much like others patented to these inventors, but differs therefrom in its use of a busy back signal controlled by the operation of the pole changer. Patent assigned to American Telephone & Telegraph Company.

833,907. Signaling Apparatus for Telephone Toll Lines; Wray, Gardner & Kinton. This is another system by the same inventors as indicated in 833,906, and embodies a similar system adapted for toll lines. When the connection is broken a supervisory signal is displayed at the central station and upon the operator's removal of her plug a signal is displayed at the call exchange and is finally retired by the removal of the operator's plug at the call exchange. Patent assigned to American Telephone & Telegraph Company.

834,208. Telephone System; Kenney & Leather. The bell coil at each substation is of different resistance. A key is used for placing any subscriber's instrument in series with an indicator at the central station and thereby securing positive action which designates the particular instrument used. Patent unassigned.

834,272. Telephone System; Dean. The central station is provided with a cross connected cord circuit which is provided with a condenser in each conductor. A current of like polarity is put upon the corresponding conductors in-



cluded between the condensers and each plug. Patent assigned to Kellogg Switchboard & Supply Company.

834,538. System and Apparatus for Measuring Telephone Service; Stroud. A register is placed at each substation in this system and is directly under control of the operator at central. This register records each call made, whether the party wanted is obtained or not. If the conversation is not successfully terminated the operator works the register to credit the subscriber with an unfinished call. Patent assigned to the Stroud International Measured Service Company.

834,832. Means for Charging Storage Batteries of Telephone Systems; Martin. In this system one of the trunk lines comprises a part of the charging circuit. The trunk line is only used for charging when it is not used for conversational purposes, and the first movement of the connector switch severs the trunk's connection with the storage battery. Patent assigned to Automatic Electric Company.

835,037. Telephone Repeater Circuit and Apparatus; Shreede. In this system there is included in each side of the main line circuit an adjustable resistance preferably in four sections and connected to separate contacts so that the balancing of the different lines connected with the main line circuit may be effectively performed. Patent assigned to American Telephone & Telegraph Company.

835,046. Telephone System; Stromberg. Provision is made in this system whereby the connection of the operator's cord circuit with a subscriber's line causes the actuation of a cut-off relay associated therewith to break the line circuit and restore the line signal. Patent assigned to The Stromberg-Carlson Telephone Manufacturing Company.

835,047. Telephone Exchange System; Webster. This is a two-wire multiple circuit and provision is made whereby both of the jack contacts are permanently connected with the telephone line limbs. The cut-off relay is normally short-circuited in one winding and the test contacts of the jacks are connected with the ground whereby any inductive or static disturbances will not interfere with the proper operation of the busy test circuit employed. Patent assigned to Stromberg-Carlson Telephone Manufacturing Company.

835,119. Telephone Attachment; Stone & Dressel. This is an attachment for the front of telephones and comprises a lever which is in engagement with the flapper rod so that when the bell rings it releases an indicator which drops down and informs the subscriber that a call has been made in his absence. Patent unassigned.

835,181. Telephone; Davidson. In this system there is provision made, should the subscriber leave his receiver off the hook, to open the talking circuit at the sub-station. The operator by sending an impulse over the wire operates a relay and breaks the talking circuit at the sub-station. When the subscriber notices his mistake and presses his hook down again the relay circuit is broken and the ringing circuit is again completed. Patent unassigned.

835,268. Distributing Board; White. In this distributing board the terminals are placed in different planes, thus facilitating the distribution and transfer of lines. It will be noted that all points where cable or jumper wires are to be soldered or otherwise secured to the terminals are in plain sight. The fuses and lightning arresters are carried upon the board. Patent assigned to Frank B. Cook.

835,361. Telephone Receiver; Mason. The permanent magnet of this receiver carries a cup separate from the enclosing shell and covered by a supplemental cap which holds the diaphragm in position. The terminals are secured in a fiber block held between the legs of the permanent magnet. Patent assigned to the Sumter Telephone Manufacturing Company.

835,441. Signaling System; Laird. In this invention the operator uses devices for grounding one wire of the metallic circuit through a signal actuating mechanism at the sub-station so that said signal mechanism may be operated from one wire and the ground whereby it will not interfere with the use of the metallic circuit to the other purposes. He also uses retarding means connected to the ground to prevent the breaking of the ground connector for a predetermined time. Patent assigned to Stanley Electric Manufacturing Company.

835,802. Telephone Exchange System; Webster. In this invention a single source of supply is used to signal the different stations and is controlled by a signal controlling magnet. A second source of supply for talking purposes is connected in a bridge of the cord circuit. Patent assigned to Milo G. Kellogg.

835,860. Microtelephone; Lind. In this invention a hollow handle serving as a mouthpiece supports a transmitter in which there are two diaphragms closely associated and so formed as to hold between them the carbon granules of the transmitter. Patent assigned to Elektromilitara Aktiebolaget, of Stockholm, Sweden.

835,865. Head Telephone Set; Pieringer. Two ear pieces are connected to the flexible head strap and one constitutes the receiver, the other has a tube and a mouthpiece running therefrom and constitutes the transmitter. Patent assigned to Western Electric Company.

835,868. Central Energy System for Telephone Exchanges; Roberts. The line relay comprises two double wound magnets having one winding of each included permanently in each limb of the line. These windings are controlled by the supervisory relays and there is means at the central office for directing excess of current through those windings included in one limb of the line for detracting a part of the current through the windings in the other limb of the line when connection is made. Patent assigned to Western Electric Company.

835,870. Alternating Current Pole Changing; Smythe. This is a vibratory pole changer for separating alternating current from a suitable source into plus or minus pulsations. The electromagnet of the pole changer is polarized. A condenser is included in the circuit with the magnet which acts as a synchronizer. Patent assigned to Western Electric Company.

835,878. Automatic Telephone Exchange for Double Wire Telephone Systems; Betulander. In this system an automatic switch is used in which there is a series of slides or movable parts which operate similar to a Veeder cyclometer, or, in other words, step by step the first slide operating along a movable part, the second moving along the first, and the third moving along the second. There is means for connecting each slide as it moves along its co-related slide and means for connecting them all together so that all three move step by step during the third period of the connection. The system is rather complicated and was invented by a resident of Sweden. The patent is unassigned.

836,049. Spring Jack Switch; North. The strip in this invention which carries the spring jacks is composed of aluminum along the front and rear edges of which are mounted suitable strips of thin, hard rubber. These are adapted to carry the test thimbles and the switch springs of the several jacks. Mica is used in several instances to insulate the different parts. Patent assigned to the North Electric Company.

836,067. Operator's Ringing and Listening Key; Dean. In this key the ringing and listening key levers are pivoted to an angular frame and have separate rollers upon their lower ends which engage the operating springs of each set. Both sets in the ringing key are arranged opposite each other and the springs of the listening key are arranged in a line with one set of those in the listening key. The offset ends of the operating springs are arranged one above the other and adapted to engage different rollers. Patent assigned to Kellogg Switchboard & Supply Company.

CAUSES AND REMEDIES OF TROUBLES IN COMMON BATTERY SYSTEMS

By C. G. Osborn

IN ALL modern telephone exchanges the common battery or central energy system is used, and the local battery system is rapidly becoming obsolete.

As most people connected with telephone exchanges are familiar with the manner in which the territory is divided into districts, it will not be necessary to describe it.

The trouble inside the exchange, from the terminal rack to the switchboard, is looked after by the switchboard men, therefore it will not be considered here. It will be proper to describe the test set used with this system.

It consists only of an ordinary receiver, preferably of the watch case type, for convenience in carrying; attached to it are a pair of long cords with suitable snaps or clips attached for connecting to clips in cable boxes or to line wires. The trouble most commonly found is a short circuit; this may appear in the cable, in the line or the instrument. In testing for it, the line must be opened at various points, nearest the exchange first, and tested from the wire chief's desk in the terminal room; if found in the cable it will be necessary to change the cable pair; if in crossed line wires, the cross may easily be shaken out and the slack pulled up; in the instrument it may be a defective condenser, which must be replaced by a good one; or the hook switch may not break the circuit when the receiver is hung up; if after an electrical storm, the carbons on the lightning arrester may be short circuited by carbon dust between them. There is also an opportunity for a short circuit in the wiring leading from the drop wires to the instrument, by reason of staples being driven too hard or the insulation being chafed off where the wire passes around a corner. The effect of a short circuit will be to cause the calling signal to show continuously on the switchboard.

Causes of grounds and their remedies come next. They may appear in the cable, in which case the pair must be changed; a line may have broken and dropped to the ground, which can easily be put up again; or a lightning discharge may have formed dust in the arresters, in which case they may be pulled out and the dust blown out. A grounded line will be very noisy and if a common return be used it will have the same effect as a short circuit.

An open circuit may be in the cable, remedied by changing to another pair; a fuse may be blown in the cable box, which can be replaced; one of the line wires may be down and must be put up; the inside wiring at the instrument may be broken or cut by staples driven too hard or the condenser or ringer coils be open or burned out. To test for it, place the test set across the line at the nearest point to the exchange; if a click is heard, the line is all right up to that point. Continue testing in this manner until a place is found where no click is heard, when the trouble will be between that point and the one where the click was last heard.

In the instrument itself there are many opportunities for trouble. It may talk all right but nothing can be heard through it; this may be caused by an open receiver circuit; it may be open in the secondary winding of the induction coil, its connections, in the cord or in the receiver itself. If in the cord, noise can be heard intermittently, accompanied by a frying or sizzling sound; if in either of the others, it will be perfectly dead. Or it may receive all right but will not talk, in which case the tranmitter will be the cause of the trouble.

The transmitter connections may be short circuited or the carbon granules in it may have become packed. If packed, a couple of sharp taps on the side will usually remedy it; if they do not, it should be replaced by a new one. If both talking and hearing are defective, the hook switch probably makes poor contact and should be cleaned by scraping or sandpapering. The transmitter may have too little carbon in it, thereby making a very high resistance for the current to pass through. It can be remedied only by replacing with a new one. Ringing may be faint, caused either by improper adjustment or partially open condenser. The ringer coils may be partially short circuited or as they are polarized the permanent magnet may have lost its magnetism. It should be adjusted so that the armature moves freely in its pivots and the clapper should just barely touch the edge of the bells on either side; the clapper should have about an eighth of an inch movement between the bells.

The troubleman should have a small leather grip or bag with a carrying strap and the following equipment:

A small alcohol or gasoline blow torch, soldering iron, quantity or flux solder, coil of duplex wire, receiver cord, receiver shell, receiver cap, transmitter, mouthpiece, condenser, lightning arrester carbons, micas, and a roll of insulating tape, a few cable box fuses, and the following tools: One pair long nose pliers, pair six-inch side cutting pliers, and a large and small screwdriver.

The foregoing will be found to cover very nearly all the ills peculiar to the common battery telephone and should enable anyone with a slight knowledge of telephony to locate and repair them.

NOVEL USE OF RURAL TELEPHONE.

A Kansas thresherman, who operates a large crew and several machines, has made use of the rural telephone lines in a way which will prove suggestive of others. The nature of his work calls for a change of location every few days. The first wagon to pull up and move is the office, which is equipped with a telephone. Immediately on arrival at a new place wires are run from the field to the nearest rural telephone line, and connection made. It is then an easy matter to order supplies, repairs, and whatever is needed, from the nearest town.

Arrangements are also made in the same way with the farmer to whom the outfit intends to move next, and help is secured from as many nearby farms or villages as may be required. The actual saving in money to a single contractor during one season amounts to a large sum, and saves hundreds of miles of driving, to say nothing of the increased convenience.

It is said that Bernard McPartland of Philadelphia, Pa., has a cheap way of making love, but, if so, it is not a very satisfactory way, for it got him into trouble yesterday.

He went to a store and called up a young woman in Atlantic City. It was one of those "pay-your-money-down" telephones, with an iron cash box beside it. For a long time patrons have been dropping lead slugs into the slots in lieu of real coins. A special policeman from the telephone company was watching it.

As soon as McPartland left the booth the policeman opened the box and found several pieces of lead, but no money. Then he arrested McPartland.

MANUFACTURERS TELEPHONE COMPANY

Facts in Reference to the Chicago Telephone Situation

By John M. Glenn

[As secretary, and in the name of the Illinois Manufacturers Association, John M. Glenn issued a statement under date of November 19 to the telephone public of Chicago in reference to the pending franchise applications of the Manufacturers Telephone Company (Independent) and the Chicago Telephone Company (Bell). This statement contains much valuable information and is published herewith in full.—EDITOR.]

THE Illinois Manufacturers' Association submits a few facts so as to enable you to understand the merits of the pending telephone ordinances. If you think that the Manufacturers' Telephone Company should get its ordinance, please ask Mayor Dunne and your aldermen, by letter or otherwise, to favor it.

The Chicago Telephone Company has been securing indorsements for its proposed ordinance. Many, doubtless, who have signed such indorsement had no accurate knowledge of the material provisions of the ordinance and were not conversant with the rates offered by the Manufacturers' Telephone Company nor with the facts here set out. If any of those who have thus signed desire to withdraw their indorsement, a communication addressed to Mayor Dunne, City Hall, will be sufficient.

This association for more than five years, on behalf of its members and the public at large, has been continuously engaged in an endeavor to compel the Chicago Telephone Company to comply with the terms of its existing ordinance. After five years of litigation that company has been required, by decree of court, to reduce its charges from $175 to $125 per year, the rate that was specifically fixed in its ordinance of January 8, 1889, for business telephones. The Chicago Telephone Company has also been required by Mayor Dunne to make return in part of the excess charges collected by it since Judge Tuley, in 1902, issued an injunction against the Chicago Telephone Company's violation of its ordinance. It has, however, made no return of the excess charges collected theretofore. It has also been compelled by a suit brought by the city to make restitution to the city of Chicago of 3 per cent of the gross receipts derived from its business done within the entire city as required by its ordinance. There has been a persistent disregard and violation by the Chicago Telephone Company of various provisions of its ordinance (to say nothing of bad service), and that made it necessary that this association, or some other representative body, should seek to protect the public against the Chicago Telephone Company's breach of duty.

The existing ordinance of the Chicago Telephone Company expires January 8, 1909. It will take approximately two years to construct a new plant capable of rendering satisfactory service to all the people of this city. Therefore the need for haste—This association having no power under its charter to engage in the telephone business, caused to be formed (for the benefit of its nearly 1,000 members who wish to avail of it) under the laws of this state, the Manufacturers' Telephone Company, for the purpose of securing to the people of this city the best and most modern telephone service, and at the lowest rates.

This association and the Manufacturers' Telephone Company are now engaged in an endeavor to prevent the final accomplishment by the Chicago Telephone Company of what is believed will be a greater imposition upon the public than anything that the Chicago Telephone Company has done heretofore. Everything that has been said or done on the telephone question by this association, or its officers or counsel, or by the Manufacturers' Telephone Company, including the effort of the latter to secure from the city the pending ordinance, has had the indorsement and approval, by formal resolutions passed from time to time by the board of directors and the members of this association.

The Chicago Telephone Company has submitted to the city council committee a new ordinance to begin January 8, 1909, when its existing ordinance expires.

The Manufacturers' Telephone Company, in its ordinance, gives the city of Chicago the election to take five per cent of its gross receipts, or one-fourth of its net profits on all of the Manufacturers' Telephone Company's business. The Chicago Telephone Company offers to give the city only three per cent on its gross receipts on business done "between points within the city of Chicago." This eliminates the gross receipts on long distance and out of town toll business, which produces a large part of the income of the Chicago Telephone Company. The Manufacturers' Telephone Company offer is based on all of its gross receipts, whether derived from local or long distance or toll business.

There are about 1,100,000 Independent telephones within a radius of a few hundred miles of Chicago. About 5,000,000 people use these 1,100,000 telephones. The Chicago Telephone Company in its present and proposed new ordinance absolutely denies to the Independent telephone users long distance connection with this city.

There are now in the United States about 3,500,000 Independent telephones, as against about 3,000,000 Bell telephones. None of these Independent telephone users can now do business by long distance with the manufacturers or merchants of this city. The long distance rates of the Bell Telephone Company are about fifty per cent higher than the long distance rates of the Independent telephone companies. The Manufacturers' Telephone Company's ordinance provides long distance connections, without discrimination, to all of the Independent telephone companies, as well as to the Bell company, which controls the Chicago Telephone Company by a majority ownership of its stock.

The Chicago Telephone Company positively refuses to give unlimited service to business telephones. Its ordinance provides that business houses shall pay per message rate. The Manufacturers' Telephone Company's ordinance offers unlimited business service at $90.00 per year, and gives the subscriber the election to determine whether he wishes measured or unmeasured service, and further provides that in no event shall the total charges for measured service exceed $90.00 per year for a business telephone.

The Chicago Telephone Company declines not only to furnish a business direct line with unlimited service, but also refuses to furnish a two-party lines business service.

The Chicago Telephone Company offers a direct residence line telephone for $72.00 and a two-party unlimited residence line for $60.00 per year. The Manufacturers' Telephone Company agrees to furnish this $72.00 service for $60.00 a year, and the $60.00 service for $45.00 a year.

The Chicago Telephone Company declines to furnish a four-party unlimited residence service, while the Manufacturers' Telephone Company will furnish one for $30.00 a year.

The Chicago Telephone Company thus proposes to force all business into the obnoxious measured service system.

Its proposed rates for a one-party business line, 100 messages per month, are $5.00. In other words, you will get a measured service for $60.00 a year, and 1,200 calls, or about four for each business day. It will charge you 3 cents a message for each of 300 messages over 100 per month, and 2 cents for every additional message.

Keep tab on your outgoing messages and see for yourself how many they average a day. Under the proposed charge of the Chicago Telephone Company ten calls a day would mean 300 a month, or 3,600 a year. The charge for this by the Chicago Telephone Company would be $132.00 a year, or $7.00 in excess of the Chicago Telephone Company's present price ($125.00) for unlimited business service, and yet that company claims that it proposes to reduce its rates. A subscriber with twenty outgoing messages a day, or 600 per month, would pay $216.00 per year, or with thirty messages a day, would pay $288.00 a year, and fifty outgoing calls per day would cost a business house $432.00 a year. You can appreciate what it will mean to keep track of your calls and to verify the Chicago Telephone Company's bills, in view of the fact that many calls miscarry. If you wish to learn the experience of others with measured service rates, write to your correspondents in New York City, where the local telephone company, also controlled by the Bell company, has the measured service method in force.

The Chicago Telephone Company undertakes to limit each call to five minutes. You can appreciate what that means if you try to keep a record of the time consumed in reaching the central office, getting connection, and frequently the time lost in misconnections.

The Manufacturers' Telephone Company, in order to protect the city's rights, agrees to make the mayor or city comptroller a director.

It is estimated that the average rates which the Manufacturers' Telephone Company proposes to charge will be nearly fifty per cent under those sought by the Chicago Telephone Company. In fact, the Manufacturers' proposed rates are so incomparably lower than those offered by the Chicago Telephone Company that counsel for the Chicago Telephone Company, on November 14, 1906, said to the city council committee, which was then hearing the matter, that the Chicago Telephone Company would not compete with the rates offered by the Manufacturers' Telephone Company. To quote the exact words of counsel: "I decline formally and advisedly to enter into competition with this company * * * the Manufacturers' Telephone Company, and at the same time I have the greatest respect for the gentlemen, as men, who speak for it. They are splendid and capable business men," etc.

The same counsel of the Chicago Telephone Company stated, in effect, at the same hearing, to the same committee, that the rates proposed by the Manufacturers' Telephone Company are so low that the city council ought to protect the people of this city against the inevitable bankruptcy of the Manufacturers' Telephone Company if it carries out its ordinance. This is a guardianship of a kind that the Manufacturers' Telephone Company neither solicits nor desires.

COMPARATIVE STATEMENT SHOWING THE TELEPHONE RATES AS PROPOSED IN THE ORDINANCE SUBMITTED BY THE CHICAGO TELEPHONE COMPANY AND THE ORDINANCE SUBMITTED BY THE MANUFACTURERS' TELEPHONE COMPANY NOW PENDING BEFORE THE COUNCIL COMMITTEE ON GAS, OIL AND ELECTRIC LIGHT.

Unlimited Service.	THE CHICAGO TELEPHONE COMPANY.	THE MANUFACTURERS' TELEPHONE COMPANY.
Business Direct line, unlimited service	Not Covered	$90. per year
Business 2-party line, unlimited service	Not Covered	$60. per year
Residence direct line, unlimited service, $6 a month	$72 per year	$60. per year
Residence 2-party line, unlimited service, $5 a month	$60 per year	$45. per year
Residence 4-party line, unlimited service	Not Covered	$30. per year
Extension instruments on Residence, unlimited service	$12.00 per year	$10. per year
Extension instruments on Business, unlimited service	Not Covered	$12. per year
Measured Service.		
1-party line, including up to 100 messages each month, $5 per month	$60.00 per year, 1,200 calls	$50. per year up to 1,000 calls.
Additional messages during the month, up to 300	3c per message	Up to 500 calls. 4c per call Up to 1,000 calls, 3c per call Up to 2,500 calls, 2½c per call 2,500 calls to 5,000 calls, 2c per call Over 5,000 calls, 1½c per call
All additional messages during the month above 400	2c per message	
Business 2-party line, measured service	Not covered	$35. per year with 700 calls
Business 4-party line measured service	Not covered	$25. per year with 500 calls
Extension instruments on Business measured service	$6.00 per year	$ 5. per year
Residence 1-party line measured service	Not covered	$30. per year with 600 calls
Residence 2-party line measured service	Not covered	$20. per year with 400 calls
Residence 4-party line measured service	Not covered	$15. with 300 calls

Nickel Prepayment Service with Outgoing Messages at 5c. Each.	THE CHICAGO TELEPHONE COMPANY. Per Year.	Calls.	THE MANUFACTURERS' TELEPHONE COMPANY. Measured Service Rates.
1-party line, 4 messages per day, guarantee of 20c per day	$73.00	1,460	$50. per year, 1,000 calls
1-party line, 2 messages per day, guarantee of 15c per day	$54.50	730	$50. per year, 1,000 calls
2-party line, 3 messages per day, guarantee of 15c per day	$54.50	1,095	$35. per year, 700 calls
2-party line, 1 message per day, guarantee of 10c per day	$36.50	365	$20. per year, 400 calls
2-party line, 2 messages, residence only, guarantee of 10c per day	$36.50	730	$20. per year, 400 calls
4-party line, 1 message, residence only, guarantee of 5c per day	$18.25	365	$15. per year, 300 calls
Private Branch Exchange Service.			
Switchboard with one full set of instruments	$36.00 per year		$35. per year
Two Measured Service trunk lines to Exchange office	$48.00 per year		$48. per year
	Calls 3c each up to 300 per mo, over 300 per mo, 2c each		Calls 3c each up to 1,000 Over 1,000 up to 2,500, 2½c each Over 2,500 to 5,000, 2c each Over 5,000, 1½c each
Additional Measured Service Lines	$ 24.00 per year		$24. per year
Branch Exchange, instruments on same premises	$ 6.00 per year		$6. per year each
Unlimited trunk lines for local messages	$365.00 per yr.		$200. per year for 1 line $175. per year each for 2 lines $150. per year each for more than two lines
Public Pay Stations for the use of the pub.	5c 10c		5c

The telephone is to be invoked as an additional security against disaster to climbers in the Alps. An instrument is to be fixed in the refuge on the mountain of the Tre Croci, in the Como region, at an altitude of about 3,100 feet.

SECOND ANNUAL ELECTRICAL SHOW

Which Will Break All Records as an Industrial Exposition

By Charles R. Macloon

INTEREST in the second show of the Electrical Trades Exposition Company, announced for the Chicago Coliseum for two weeks—January 14 to January 26—far surpasses that of the first show, which was conceded to be the most successful trade exposition ever held in the country. Although the affair is yet six weeks away, practically all of the space of the main floor of the building has been contracted for by leading electrical concerns of America, and it is probable that much of the Annex will be used for exhibition purposes. In all, 25,000 square feet of space has been sold, which is nearly 25 per cent more than the exposition company had sold when the show opened last year. The interest in the exposition and the results that manufacturers and dealers get from displays of this kind may be estimated from the fact that many exhibitors have doubled the space they used a year ago that there are many new concerns represented and that but few of the electrical trades people who had space in the first show are missing this year. In fact, the demand for space has been so great that the success of the second show was long ago assured. This year the exposition is under the managing direction of Homer E. Niesz, who served as a director and chairman of the publicity committee a year ago and was a big factor in the success of that affair. The Electrical Trades Exposition Company is maintaining offices at 1006-7 Monadnock building, Chicago.

Homer E. Niesz, Managing Director Electrical Trades Exposition Company.

The complete list of exhibitors to date is as follows:

Armour Institute, American Steel & Wire Company, American Telegraph & Telephone Company, Automatic Electric Company, Allis-Chalmers Company, American Telephone Journal, Aetna Electric Stage Lighting Company, Albert & J. M. Anderson Manufacturing Company, American Clock Company, J. W. Burns, Bryan-Marsh Company, Bryant Zinc Company, Brilliant Electric Company, Bidwell Electric Company, Beck Flaming Lamp Company, W. P. Crockett Company, Chicago Telephone Company, Chicago Pneumatic Tool Company, Frank B. Cook, Central Electric Manufacturing Company, Chicago Battery Company, Chicago Edison Company, Crane Company, Central Electric Company, Chicago Lamp & Reflector Company, Chicago Compound Battery Company, Joseph Dixon Crucible Company, Dossert & Company, Duncan Electric Manufacturing Company, Diehl Manufacturing Company, Dean Electric Company, Eureka Electric Company, Engineer Publishing Company, Edwards Electric Headlight Company, Electric Appliance Company, Electric Rotary Floor Polisher Company, Electric Storage Battery Company, Electrocraft Publishing Company, Electric Service Supplies Company, Electrical Review, Erwin & Company, Electrical World, Fort Wayne Electric Works, Federal Electric Company, Emil H. Grubb, M. D., Gould Storage Battery Company, General Electric Company, Holcombe & Co. (New York City), Haller Machine Company, J. Allen Haines, Holzer-Cabot Company, Felix Hamburger, Johns-Manville Company, Kellogg Switchboard & Supply Company, J. Lang Electric Company, Monarch Electric & Wire Company, W. N. Mathews & Bro., Metropolitan Electrical Supply Company, McRoy Clay Works, Niagara Tach. & Instr. Company, National Carbon Company, National Battery Company, Nungesser Battery Company, Oliver Mfg. Company, Ohio Brass Company, Oneida Community, Ltd., Peabody Coal Company, Phoenix Glass Company, H. A. Petersen Manufacturing Company, Pierce Specialty Company, Reynolds-Dull Flasher Company, Roth Bros. & Company, Rock Island Battery Company, Shelton Electric Company, J. L. Schureman Company, Stromberg - Carlson Telephone Company, Swedish - American Telephone Company, Simplex Electric Heating Company, W. H. Schott, Stolz Electrophone Company, Shelby Electric Company, The Consumers Company, TELEPHONY Publishing Company, Universal Manufacturing Company, Universal Electric Storage Battery Company, Vulcan Electric Heating Company, Vim Company, Vesta Accumulator Company, Wagner Electric Manufacturing Company, Western Electric Company, Westinghouse Companies, Western Electrician, Western Insulator Company.

A perusal of the above list will show that the telephone interests are represented much more largely than in last year's show. This is not only on account of the benefits the trade will secure from an exposition such as this, but because of the local telephone situation which brings the Independents into this field with the battle cry: "On to Chicago." The Automatic Electric Company, the Swedish-American, Stromberg-Carlson, Frank B. Cook, Electric Appliance Company and others have doubled their space.

The new telephone concerns in the show this year are Holzer-Cabot Electric Company, Dean Electric Company and others. TELEPHONY will have its usual space.

Managing Director Niesz sent a representative to New York last week to try and get a temporpary installation of the Cahill telharmonic system in the coming show, but Dr. Cahill's representatives said that this would be a physical impossibility, as there is only one telharmonium completed which is now the beginning of the permanent installation of the New York Electric Music Company which has commenced its service of music to clubs, hotels, cafes and residences over the New York telephone company wires. Manager Pihl of the New York company, however, agreed to attempt a long distance test of the telharmonic system by which an effort will be made to transmit music from the New York central station to the Coliseum during the exposition. The longest test yet made of the Cahill system was from Holyoke, Mass., to New Haven, Conn., about 100 miles.

While every branch of the electrical craft represented in the Coliseum at the show, the management has not overlooked the novelties that would tend to draw the general public to the exposition. Managing Director Niesz has succeeded in bringing together for this exposition everything that is necessary for electrifying the modern home of today—everything from the incandescent lamp to the electrically rocked cradle, from the electric cooking stove to the electric piano, from the electric heater to the electric refrigerator. In fact, there is not a thing about the modern home to which electricity may not be applied, and from this standpoint the coming exposition will be a marvel. For the newly wedded pair with visions of sleepless nights and stray carpet tacks with annoying upturned points he has secured an exhibit that will be a positive comfort and boon. "It's an electric cradle—the latest novelty in our line," he said. Continuing, the managing director said: "That old saying about the 'hand that rocks the cradle' passes into insignificance with the new quotation, 'the hand that starts the dynamo.' It's a wonder that the electrical cradle hasn't come before this for it's the most simple thing imaginable. With an attachment similar to that on an electric fan the rocking of the crib can easily be controlled. As soon as the current is turned on it is rocked with a smooth, soft motion, and by pressing the lever it can be made to go fast or slow. There'll be no more sleepless nights for father. When baby begins to cry he won't have to walk it; he'll just turn over, push the button and electricity will do the rest." As the readers of TELEPHONY know, everything imaginable has been invented along electrical lines for the nursery, from the heater for the milk bottle to the electric warming pad for the crib. At the same time inventors have not neglected the luxuries as well as the necessities of domestic life. The chafing dish is one of the new and handy things that may be connected with the ordinary current. Sewing machines are now run by motors—so are washing machines. The ironing may be done with electrically heated irons. In fact, thousands of devices for making the "home comfortable" will be exhibited at the Coliseum show.

And as heretofore one of the features of the show will be TELEPHONY'S booth, which will be the meeting place and headquarters for telephone men the world over.

EFFECTS OF THE TELEPHONE.

The "oyster king" of New York city has just been "put out of business" and has lost his monopoly of the trade because of the telephone. The connection between cause and effect, and the bankruptcy of the bivalve monarch is thus explained: Instead of going over to the docks on the Hudson river to buy oysters nowadays, the big hotel and restaurant managers of New York simply ring up the oyster planter on the telephone and order oysters direct, or give the order to the oyster agent, who telegraphs it to the planter. Then the oysters arrive by railroad train. That, they say, puts the oyster barge business "in bad," and forces many of the old time barge captains to the wall. The telephones have wiped out the middle man or jobber. Consequently many of the old wholesalers have been driven out of business, and instead of thirty oyster barges lined up along the North river piers, there are now but two or three.

THE TELEPHONE IN RAILWAY SERVICE.

At a recent meeting of Union Pacific officials and employes at Omaha for the consideration of practical subjects, Mr. L. H. Korty, superintendent of telegraph, introduced the discussion on telephones with the following remarks:

"The telephone is becoming a most valuable aid in the operation of trains in large yards and terminals. Quick work is necessary because of the constantly increasing volume of business.

"Telephones are being introduced in connection with the automatic block system now being installed, as they will place the dispatcher in close touch with the non-telegraph stations. Portable telephones will be placed on trains for use on the wires of the system in emergency cases. On some other sections of the road it is contemplated to introduce the composite system, by means of which one wire may be used simultaneously for telegraph and telephoning. Trains will be equipped with portable composite telephone apparatus, enabling conductors to reach the dispatcher or nearest telegraph office. Where the use of the composite is impracticable, the most economical arrangement is to string a single iron wire between a siding and nearest telegraph office and connect with telephones. This places trains at sidings within reach of the dispatcher.

"Experiments with telephones on trains are in progress on this road which, it is hoped, may result in devising apparatus that will make it possible for the engineer and conductor to successfully carry on conversation and compare their understanding of orders.

"A wrecking car on each division is supplied with two portable telephones, and a reel carrying one-quarter mile of insulated wire for use at wrecks, washouts, etc., which are used to place the temporary telegraph office in communication with the repair work, the covered wire being stretched along the ground. The arrangement keeps the division promptly advised as to the progress of repairs, etc.

"The movement of trains by telephonic orders in certain localities, under certain safeguards, is possible and is already being done on some roads. On the Union Pacific between Council Bluffs and Gilmore, in conjunctioon with the block signal system, the movement of trains is very greatly facilitated by use of telephones by the dispatcher in one of the towers. Official and private cars, while standing on sidetracks at important terminals, may be quickly connected with private branch exchanges, or local and long-distance lines, thus giving the occupants of such cars telephonic service as at their offices or homes. Such an arrangement is in vogue at the Omaha union station.

"Long distance telephone lines between division and district terminals would afford invaluable service to operating and traffic departments in giving orders and exchanging information which now overburdens the telegraph wires. I look forward to the time, in the not distant future, when the telephone service of the Union Pacific will be co-extensive with that of the telegraph; with long-distance telephone circuits along the main lines capable of satisfactory use between the extreme limits of the road, not as a rival of the telegraph, but rather as an auxiliary thereto, and as a direct and quick means for personal conversations between officials, agents and others. Each system has its particular advantages over the other, the telegraph being the best where a record is required."

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Ed. J. Mock . . . . . Secretary and Treasurer
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EDITORIAL DEPARTMENT

A WORD FOR THE "HELLO" GIRL.

AS THE season of "good will to men" approaches, and the Christmas bells begin to tinkle, it is in order to bespeak a little "peace on earth" for the other sex—the telephone girl. If ever a worker was entitled to the charity and kindness which belong to the Christmas time it is the "Hello" girl at the switchboard who day after day has to contend with a thousand and one difficulties which would provide excellent training for a saint. Not that all telephone operators are saints, but after all, taking them all together, they deserve much credit for their patience and forbearance under circumstances frequently trying in the extreme. And, too, they deserve more consideration than they ordinarily get.

The operator is the only person connected with the telephone exchange that the man ringing "Central" knows, and it is on her head that he visits his displeasure at any trouble he may experience. Harsh words and unreasonable complaints are hurled at the telephone girl although she may be —and probably is—not only innocent of blame but is trying her best to accommodate the subscriber. Still, the subscriber seldom takes that into consideration. Neither does he remember that while he registers only one complaint the telephone girl must receive scores from subscribers as impatient and brusque as he. The exchange operator has nerve-straining work to do even under the most favorable conditions, and she endeavors to perform it as promptly and well as possible. It is to her interest to serve the patrons of the company as quickly and efficiently as may be. To "call her down" does not facilitate matters in "calling up" the party desired, and, besides, in most cases it is doing a faithful worker an injustice and adding to her already heavy burden. It is not to be denied that occasions arise in the best-regulated telephone exchanges when the subscriber is strongly provoked to shake things up a bit, but it is also well to remember that the greenest novice in natural history will tell you that molasses catches more flies than vinegar.

So be pleasant to the "Hello" girl, and, if you can't be pleasant, be kind. Remember she has trials as well as you, and more of them, too, in a telephone sense. She is getting better every day and more is required of her. She is doing the best she can and by making her work as pleasant as possible you will advance your own interest.

Wish her a Merry Christmas—as TELEPHONY now does —and a Happy New Year, and during 1907 remember her burdens and make them lighter. It will be not only fair but profitable.

WHY HOME COMPANIES WIN.

WITHOUT being provincial, the average American citizen is loyal to home institutions. There is something in his blood—bred in his bone, perhaps, from the days of '76 —that impels him to support and defend the local cause. That is why the Independent telephone movement has met with such wonderful success despite the obstacles planted in its path by the Bell combine. An Independent telephone company represents home enterprise, home energy, home dollars and home interests generally. The people have more to say about its management than they can ever hope to have about a Bell concern which is simply a money-hunting scout sent out by eastern capitalists who have no other interest in the locality where the company operates aside from the financial returns it furnishes.

Almost invariably the stockholders in an Independent company are the merchants, bankers, manufacturers and farmers living in the community. They spend their money there and are interested in the welfare of the place. They patronize and deal with the people who are subscribers to

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their telephone exchange. It is a case of reciprocity. It is a fair deal.

The stockholders in a Bell company live elsewhere, and for that reason do not care a rap whether the town lives or dies so long as the company pays a profit. The other day the American Telephone and Telegraph (Bell) Company of Iowa held its regular stockholders' meeting at Davenport. After the transaction of miscellaneous business the following board of directors was elected:

Edward P. Meany, of New York; Melville Eggleston, of New York; Chas. R. Bangs, of New York; J. C. Vail, of New York, and E. E. Cook, of Davenport.

Four of the five directors are New York men. Independent companies represent home rule. The contest for the control of the Illinois Central railroad has recently attracted wide attention in financial and railroad circles, and the agitation of the question brought out the fact that the law under which the company obtained its charter from the state of Illinois provided that a majority of the directors must live in that state. This stipulation was made on the theory that local men are more likely to manage local enterprises in the interest of the community affected than are aliens—if such terms may be applied to residents of distant states. Much of the dissatisfaction at the turning over of the Illinois Central was due to the fact that men far away were to rule its destinies.

We are more likely to trust men that we know—all things being equal—than strangers. If things do not go right we can go to our neighbors and have an understanding. Nine times out of ten they are glad to be advised. for the interests are mutual, but there isn't much satisfaction to be had from the foreign corporation, especially of the Bell type. The only way to impress a trust is to cut holes in its dividends. and that is what Independents are doing wherever competition exists. The innate hostility of the American people to monopolies is achieving great things for Independent telephony and will achieve greater, for, once aroused, the people are not to be denied. They are becoming exceedingly tired of the "outlander" Bell companies.

THE STORY OF THE STATES.

THERE is a great amount of sentiment in the Independent telephone business—patriotic sentiment—sentiment that makes for freedom of speech. From the start TELEPHONY has consistently endeavored to assist in the making of this sentiment for the strengthening and building up of the movement. But behind it is the impetus of the business itself and the patriotic influences which have brought millions of capital into the Independent telephone industry. We are combating the Bell, a powerful opponent, a combination of capital aggregating $250,000,000, systematically conducted. The management of this vast monopoly, the American Telephone & Telegraph Company, is charged with all of the evil practices resorted to by other monopolistic corporations. It is not only accused of misdeeds. but it has been proved guilty, not once but time and time again. In the long category of its wrong-doings, there is no other element which has created greater havoc than its iniquitous press bureau.

The creation of this press bureau must have been accidental. The very nature of the telephone trust's business and the conditions existing with the press when telephones were first utilized for public service warrants this belief. Telephones were promptly recognized in newspaper offices as necessities and proprietors were eager to make the most desirable arrangement for the service. The company having control of telephone service sought to make contracts with the newspapers binding them to support, or at least sanction, the Bell policy. For this reason most of the press was not awake to the real situation until the Independents got on their feet and made telephone competition a reality. Remarkable as it may seem, even after ten years of unparalleled activity and development, a portion of the public press of the United States is still indifferent to the evil policy of the Bell company. This, then, is the past and present condition of a dangerous weapon in the hands of the foe of Independent telephony, and yet Independents have never made a concerted effort to effectively cope with the situation.

TELEPHONY has maintained a separate organization for years for the purpose of gathering and compiling statistical data that would show true Independent conditions. The money spent in this work aggregates thousands of dollars. Infinite patience has been exercised in overcoming the reluctance of Independent operators to give the necessary information sought. Month in and month out and year in and year out this department of TELEPHONY has slowly collected from Independent operators the answers to questions that might be used for the credit and uplift of the business as a whole. The only interest TELEPHONY has had in the enterprise was to help in the advancement of a movement in which it is identified as a live and aggressive factor, and although never wholly satisfied with its accomplishments in this direction, intends to continue the work. It is essential that competition should prevail everywhere in order to make the desired showing against the Bell company. Franchises must be had in every metropolis. Undisputed sway of the Bell company in the larger cities has made possible its great influence with the civic government. City councils are slow to act and hard to convince. The Independent promoter encounters every disadvantage in seeking telephone franchises, and he needs all the available facts and convincing arguments to further his enterprise. TELEPHONY aims to supply this data. It is comforting in a large degree to realize that there has been no important telephone franchise granted in America during the past six years whose promoters did not rely on information gleaned from TELEPHONY's records concerning one of the country's most vigorous infant industries.

The Independent telephone industry has no organized press bureau to disseminate this helpful information. It will never be able to accomplish all it may hope to achieve until Independent operators co-operate with some reliable organization in work such as has been outlined.

To this end TELEPHONY believes it is important that the Independent telephone exchange operators in every state should send it these essential facts. First, The number of Bell instruments in use in their operating territory before competition; second, the number of Bell instruments now in service; third, the date of incorporation or establishment of the company; fourth, the amount of capital stock; fifth, the number of instruments operated; sixth, the kind of instruments, namely, business telephones and residence telephones (include farmer's telephones with residence telephones); seventh, the rates charges for both business and residence telephones.

Owing to a lack of reliable information concerning Independent operating exchanges, the industry as a whole often suffers from the gross misrepresentation of the Bell press bureau. It is the desire of every honest Independent to serve the wants of patrons. These patrons are inclined to favor the service offering the largest opportunity. The Bell company uses its every advantage and strikes at the weakest point in the Independent telephone fabric to emphasize its terrorizing power. Statistics of Independent strength will go far to counteract this work of the monopoly and prevent a successful continuation of it. The Independents can help themselves by giving TELEPHONY the required data that it is seeking.

It is our purpose to tell the tale of Independent telephony in a series of articles entitled "The Story of the States," beginning with Illinois, the cradle of the telephone movement. The state is not the best developed in an Independent way, but it is not far behind some of its leaders. There are about 2,400 cities, towns and villages in the common-

wealth. Our record show that the Bell company operates exchanges in 205 places, and the Independents in 604 places, with sub-exchanges in 392 places. With a Bell handicap of more than 100,000 instruments in Chicago, it is common belief that the Independents have more telephones in service in the state than has the Bell. We want to be exact, and our efforts are directed first to Illinois.

Help us to present information arranged as follows:

TOWN—	Number Bell Instruments Before Competition	Number Bell Instruments Now	Incorporated or Established	Capital	Number Instruments Installed	Business Instruments	Residence Instruments
Cabery	0	0	1903	6,000	192	32	160
Canton	400	450	1902	75,000	900	200	700
Dahlgren	0	16	1902	10,000	300	35	265
Dixon	150	250	1896	125,000	1,300	400	900
Elkhart	3	3	1906	1,250	100	14	86
El Paso	156	0	1902	10,000	697	60	637
Freeport	660	560	1902	150,000	1,725	525	1,200
Galesburg	700	871	1902	250,000	2,845	733	2,112
Metamora	13	0	1901	3,000	270	16	254
Pekin	..	..	1906	2,500	...	...	...
Reddick	42	30	1903	10,000	248	40	208

In addition to giving statistics embodying every Independent system in the state, we want photographs showing exterior views of the exchange buildings. Every Independent exchange manager who has not sent us this information is urged to do so at once, for the first article of the series, "The Story of the States," will appear in the January TELEPHONY.

THE CHICAGO SITUATION.

THE Bell trust is on the run in Chicago. A battle royal is on between the monopoly and the Independent telephone interests before the city council, and at this writing the indications point to a victory for the forces that demand competition and the relief that competition will bring them from the Bell octopus. The trust, in this instance, is the Chicago (Bell) Telephone Company. The Independents are the advocates of the ordinance of the Illinois Manufacturers' Association, which seeks a franchise from the council to build and operate a telephone plant in Chicago that will enable the public to escape from Bell oppression and establish communication with more than a million Independent telephones from which it is now barred.

Needless to say, the Bell concern is fighting this bid for an Independent franchise with all the vigor and peculiar ingenuity at its command, and that is what makes it a battle royal, for both sides are on their mettle and bound to win. For two weeks the fight has been waged before the council committee on gas, oil and electric lights, and the hearings have brought out many facts that are certain to injure the Bell combination all over the country, for in Chicago, as elsewhere, its tactics, when run to earth, show that the combination is guilty of all the despicable practices which make trusts of all kinds so thoroughly hated throughout the United States.

By employing its usual methods to perpetuate its monopoly the Bell company has aroused the resentment of the city officials, the aldermen and the telephone public. Mayor Dunne has openly declared that the Chicago Telephone Company must change its policy if it hopes to retain its standing before the council. Its arrogant disposition and bulldozing tactics have combined to place it in a bad light before the people of Chicago, and it is generally admitted that the Independent movement is bound to profit by the Bell's dog-in-the-manger attitude.

Not long after the Illinois Manufacturers' Association introduced its ordinance asking for a franchise the Bell concern began to fight it actively. Its hired attorneys tried to convince the council committee that the Manufacturers' association could not carry out the terms of the franchise, that the rates were too low, and cited numerous other objections, including one that the directors of the association were not back of the enterprise. Being unable either to laugh or bulldoze the Independents out of court, the Bell outfit adopted another course. It was both an attack on the competing company and a measure of self-protection for the Bell. The Bell concern submitted an ordinance of its own and asked the Chicago council to accept that and throw the Independent measure overboard. The Bell ordinance provided for a 20-year extension of the franchise, and pretended to offer the city a wonderful bargain by reducing rates and abolishing toll line charges within the city limits, which, by the way, the public has denounced as extortion for years. Since then the war has waged fast and furiously before the council. The propositions submitted by the two companies have been discussed pro and con, and the Independents are growing more confident every day that they will win in the end.

Perhaps no more certain sign of this coming result is needed than the fact that the Bell company has angrily refused to meet the competitive rates proposed by the Manufacturers' association in its ordinance, which also represents the ideas of Arnold Kallman of the Kansas City Telephone Company, also Independent. The agents of the Bell not only lost their tempers and declined to meet the Independent rates but withdrew from the committee meeting in much the same spirit which actuates the peevish little girl who takes her dolls and goes home refusing to play any more. Thus the matter stands and the feeling is strong that, rather than cater to the bulldozing Bell trust, the council will give the Independents a chance to build into Chicago and save the city from utter dependence on the monopoly for telephone service.

"If the corporation now holding a franchise (the Bell concern) adheres to its position it looks as if the city would have to deal with some other company," said Mayor Dunne after the trust had displayed its ill nature. "The permit will have to go to any responsible company which offers the lowest rates and gives proper assurances of efficiency."

It was not only the greed of the Bell company—for Chicago has grown used to that—but its intolerance of possible competition that made Mayor Dunne and the people of Chicago generally feel impatient with the Chicago Telephone Company. Its counsel, John Barton Payne, declared at the outset that the Independents were bluffing and that the Manufacturers' association ordinance was only intended to force the Bell company to give lower rates. When the association offered to give a bond for $1,000,000 for the performance of the contract the Bell lawyer sought refuge behind the allegation that the competitive rates were ruinous, and that the Independent company would not give the city satisfactory service. The Independents came back with sledge-hammer arguments. They offered the city an even better bargain, agreeing to these amendments:

Life of the franchise cut down from thirty years to twenty.

Free telephone sets to the police and fire departments.

City offered option of taking five per cent of gross income in place of the 25 per cent of the net income, as provided in the former ordinance.

Partners, officers of corporations and employees having home telephones allowed free insertion of office telephone number.

Abandoned the five per cent "bonus" in case of purchase by the city.

Raised guarantee bond from $100,000 to $1,000,000.

It was after this offer, which struck the Bell company between wind and water, that its representatives withdrew in a huff, declaring they would not duplicate the proposition.

Both Mayor Dunne and the Independent leaders have punched the Bell ordinance full of holes, and convinced the council committee that it would be a betrayal of the city's interests to accept it in lieu of the Independents' proposi-

tion. Meantime the Bell agents are working like beavers to save their bacon. One of their schemes is to hoodwink telephone users to sign a petition asking the council to pass the Bell ordinance granting the 20-year extension. Employes of the Bell visited residences and importuned women to sign "because it means better service." One solicitor said he was paid a cent a name for the signatures he secured to bolster up the Bell ordinance. Of course nothing is said by these solicitors about the Independents' ordinance or competition, but the Chicago papers have exposed the Bell trick and put the public on its guard.

An interesting feature of the telephone hearing in Chicago, and one which throws light on the methods of the Bell trust, was the admission of Attorney Payne that the Chicago Telephone Company buys $300,000 worth of Bell apparatus every year, according to contract. It also developed that 51 per cent of the stock of the Chicago Telephone Company is owned by directors of the Bell parent corporation. In this connection the statement of W. H. Johnson, a former superintendent of the Chicago company, is of value. The Bell agents had asserted that the Independents could not give satisfactory service at the rates they offered. According to Mr. Johnson the Independents could do business profitably because they could build less expensively, not having to purchase supplies and apparatus from the Bell. His statistics showed that the investment for each telephone in Chicago is about $120, under the Bell regime, while the cost of maintaining and operating a telephone in cities where the Independents are in the lead is from $14 to $18.

Estimating the maximum cost of operating and maintenance at $20 a telephone and allowing a depreciation of 10 per cent, which is high, Mr. Johnson stated that the total expense would approximate $32. With an average income of $50 a year this would leave a profit of $18.

Another insight into Bell methods was given Chicago by the discovery that, in order to stifle competition, agents of the trust had been holding secret conferences with State street merchants and business men offering them "special contracts" if they would support the Bell ordinance for a franchise extension.

In short, the deeper the telephone situation is probed the more will the people be convinced that it is time to end the Bell monopoly and give the Independents a square deal and a fair chance in the field of commercial endeavor.

THE COMING ELECTRICAL EXPOSITION.

THE second annual exhibition to be given at the Chicago Coliseum from January 14 to 26 by the Electrical Trades Exposition Company promises to be even more successful than last year when, although it was the christening of the association, all records were broken for attendance at the big hall for an industrial show. Months ago Managing Director Homer E. Niesz reported that more space had been sold to exhibitors than was taken last year. At the last electrical show there were 109 exhibitors who occupied 26,000 square feet. Weeks ago the diagram of the Coliseum showed that nearly 40,000 square feet had been reserved by 127 exhibitors, and the indications are that by the time the big show opens the floor space of the exhibition hall will be completely exhausted. Telephone manufacturers and supply houses are taking an increased interest in this exposition for Chicago just now is the storm center of a fierce fight between the Bell and Independent forces. Most of the exhibitors at the show of 1906 are preparing to make a more elaborate display next month, and it is certain that the exposition of 1907 will be the most complete display of electrical devices ever held.

The wonderful development and growth in the electrical field are seldom adequately realized until the products of the inventors and manufacturers are gathered together for the people to inspect and study. A splendid opportunity to observe the constant advancement in this impoprtant industry will be furnished at the Coliseum in January for the display of novelties will surpass any previous attempt. Telephone men particularly will be interested especially in a number of new features relating to their business, notably the telharmonium which will transmit music over the long distance line from New York Representatives of the Electrical Trades Exposition Company are negotiating for a temporary installation of this marvelous invention which, it is claimed, will supply clubs, hotels, halls and residences with music from a central station. Another unique novelty, showing the general uses to which the electric current is put, is a "cradle rocker" that will be seen by visitors to the great show.

During the exposition a number of organizations identified with the electrical business will hold their annual conventions at the Coliseum or at the hotels so that the delegates and members can attend both events. The Northwestern Electrical Association will hold its annual meeting January 16, 17 and 18, transferring the meeting-place from Milwaukee, where it usually convenes, to Chicago on account of the electrical show that will be in full blast at that time. The Western Electrical Association, the Electrical Salesmen's Association, the Allied Electrical Trades and other organizations will meet in Chicago the same week.

Manufacturers of telephone apparatus will exhibit all the modern equipment and visitors will be able to obtain many valuable and new ideas of the progress made in this line. Independent telephone men from all over the country will be in attendance. It is estimated that $300,000,000 capital will be represented by the exhibiting companies participating in the show, as ten corporations alone on the list represent two-thirds of that immense sum. The prospects for an increasing sucess next month render it certain that the Chicago electrical show will become the big industrial exposition of the country every year.

USEFUL HINTS FOR EXPORTERS.

AMERICAN manufacturers of telephones and supplies are building up an important trade abroad, and every year are exporting more goods to foreign countries. The growth of this export business emphasizes the need of information about commercial methods in other lands which will enable our manufacturers to push their trade to the best advantage. Those who solicit business by means of catalogues and trade circulars especially require this knowledge, for it is patent that catalogues and circulars adapted to getting business in the United States will not suffice in foreign countries. Different countries need different catalogues on the same principle that the same arguments will not sell goods to every class of buyer. To begin with, the catalogue must be translated into the language of the country to which it is to be sent, for it requires no argument to prove that an English price list would be of no more value in China than a Chinese catalogue would be in the United States. When in Rome do as the Romans do. When seeking business in Russia—whether by catalogue or through a salesman—you must use the language of the Czar.

Men experienced in foreign trade have proved the value of having catalogue translations made by an expert who knows the needs of the people for whom it is intended. He should have a knowledge of the country, its manners and customs and the ways of the men whose patronage is solicited. Such a translator would not fall into the error—often committed—of using Americanisms that would be absolutely meaningless to the prospective customer in Italy or France. As one adviser has put it: "Do not attempt to tell your story in baseball dialect for a country which has never heard of baseball." It must also be borne in

mind that what is familiar to people in the United States may be absolutely unknown in the foreign country where trade is sought. To meet this condition instructive pictures and clear descriptions will go far to explain the goods to the buyers, and make them understand in what way the articles advertised will fill the want. Another point to keep in mind is the desirability of avoiding as much as possible the use of technicalities in catalogues for foreign consumption. It frequently happens that our technical terms have no equivalent in a foreign tongue, and the effort of the translator to render them into the native language would exhaust him and hopelessly confuse the reader, no matter how eager he might be to fathom the latest circular from "the States."

Needless to say the wise shipper will satisfy himself first that his goods are wanted in a country before opening a campaign for business, for it would be folly to try to sell ice cream freezers in Greenland, gas stoves in the South Sea islands or telephones in a land populated entirely by deaf mutes—although in time our enterprising Independent manufacturers may put on the market a device that will meet that contingency. The foreign catalogue should tell its story in a straightforward, comprehensive style, and its author should always keep in mind for whom it is intended, their location and, of course, their distance from the shipping point. The usual phrases about "delivery in a few days," "telegraph orders" and the like should be eliminated from the foreign catalogue, for while they are pertinent and useful in this country, it is impossible to make them apply to foreign trade. Exporters will be able to obtain many more valuable ideas if they secure the catalogue of a dealer on the ground who handles a similar article.

THREE INDEPENDENT VICTORIES.

DURING the last month the Independent telephone movement scored important victories in three large western cities—Milwaukee, Denver and Omaha. In each of these cities the people, by referendum and popular vote or through the common council, declared that the Bell monop-

"Hello, Milwaukee, Omaha and Denver."

oly in the telephone field must cease, and that the Independents shall be authorized to furnish competing service. Of course, the Bell trust fought bitterly to keep out rival companies but, as in all cases where the people take an active interest, they insisted on fair play and monopoly was firmly advised to retire to the rear and be seated. In this issue of TELEPHONY the Milwaukee situation is described at length, and a perusal of the history of the fight, the defeat of the Bell obstructionists before the council—which granted the Independent franchise with but one dissenting vote—and the plans of the new company the Independent emblem a familiar sight throughout Wisconsin will doubtless be gratifying to all brethren of the shield.

At the November election the voters of Denver decided in favor of granting an Independent telephone franchise, and the reign of the Bell monopoly there will soon be at an end. The telephone public of Denver welcomed the opportunity to escape from the tentacles of the Bell octopus and the Independent victory is considered an important step in advancing the movement in that section of the country.

The Omaha victory was won after a hard fight. More than a year ago the attack was made against the Bell which considered itself so strongly entrenched that the Independents would have no show to obtain a franchise from the Omaha council. The issue of whether an Independent franchise should be granted figured in the spring campaign, and, of course, was opposed with the power of the Bell combine and its allies. Finally the struggle culminated in the question being submitted to a vote of the people of Omaha at the election last month. By a vote of 7,653 to 3,625—more than two to one—the citizens ratified the Independent franchise, and the result is sure to be of great value in strengthening the Independent movement throughout the middle west. The most progressive business men of Omaha, tired of the Bell tactics, united in working for the Independent franchise, and the condition of public sentiment is considered a guaranty that the new enterprise will meet the success its promoters hope for and expect.

In all of these cities, which have thrown the doors open to the Independent telephone movement, there is much satisfaction at the prospect that hereafter they will no longer be isolated from the surrounding territory spanned and criscrossed with Independent wires. Connection with outside towns, which has been denied by the selfish policy of the Bell trust, has proved a valuable ally of those seeking a franchise in the Bell strongholds. The Independent triumphs in Milwaukee, Denver and Omaha round out the year 1906 in a glorious fashion and give promise of another successful record in the new year about to begin.

TELEPHONES AN AID TO RAILROADS.

UP-TO-DATE managers of inter-urban street car and steam railroads are realizing more fully every day the value of the telephone in the successful operation of their systems. The importance of instantaneous communication between the various power houses, stations, offices, repair shops, car and round houses has been permanently established, and no modern equipment lacks a telephone exchange to keep each department in touch with the others. All the big steam railroads would no more think of dispensing with their telephone system than with their telegraph lines. In fact, the telephone has superseded the telegraph in many ways. In the old days when an engine and crew were needed for emergency work messengers were utilized to carry the orders for the summoning of the men and the preparation for the trip. To-day this work is done by telephone and in much less time. Street car companies in large cities depend on the telephone for the transmission of orders and the communication of information between the general offices, the power houses and the shops. Interurban lines that traverse large areas of territory are finding the telephone especially valuable. In the towns and cities telephone wires connect the starter's office with the quarters of train crews, and in case of break-downs a message sent to the repair shop expedites a clearance of the trouble to a large degree.

Executive officers of car lines have come to rely on the telephone altogether. Often when inspecting some part of the system, or absent on other business, important matters come up at headquarters that demand their immediate attention. They are soon located by means of the telephone, and either pass on the question by talking over the wire or

are able to return to their office at once, often saving serious loss or preventing the derangement of vital plans. In no other business is time so important a factor as in the railroad business, and the telephone has repeatedly proved itself essential to a speedy dispatch of traffic affairs. Where large bodies of men are employed it is important to have the various departments in close touch with each other, and although widely separated, the telephone enables them to work in harmony as was never possible before its use became general. The cost of installing private telephone systems in car shops and offices has proved but a drop in the bucket compared to the substantial benefits derived from their advantages. As an important factor in railroad operation the telephone has won an assured place on every traffic line in the country, and its use is certain to be extended with each succeeding year.

OPERATING BELL COMPANIES.

THIS publication has received many requests for a complete list of the Bell operating companies and the territory covered. There are thirty-six of these companies covering territory as follows:

Maine, New Hampshire, Vermont, Massachusetts and the extreme southeasterly part of Rhode Island—New England Telephone & Telegraph Company. The remainder of Rhode Island, including Providence—Providence Telephone Company.

Connecticut, excepting the town of Greenwich—The Southern New England Telephone Company.

New York is divided among seven companies. The New York Telephone Company operates in New York City (Manhattan and the Bronx) and a small district to the north and east, immediately adjacent to the city. This company also operates in Greenwich, Conn. The New York and New Jersey Telephone Company operates in Long Island and Staten Island. The Hudson River Telephone Company operates in the Hudson River Valley, with considerable territory on each side. The Central New York Telephone & Telegraph Company operates in the whole central section of the state, with headquarters at Syracuse. The northwestern part of the state is handled by the Empire State Telephone & Telegraph Company, the southwestern part by the New York & Pennsylvania Telephone & Telegraph Company, and the Bell Telephone Company of Buffalo operates in the extreme western and northwestern counties.

New Jersey is divided between the New York & New Jersey Telephone Company and the Delaware & Atlantic Telegraph & Telephone Company by an irregular line drawn north of Trenton. The Pennsylvania Telephone Company operates a few exchanges on the west central boundary.

Pennsylvania is handled by the Central District & Printing Telegraph Company in the west and southwest; by the New York & Pennsylvania Telephone Company in the north central and northwest; by the Pennsylvania Telephone Company in the central part, and by the Delaware & Atlantic Telegraph & Telephone Company in the east. The Bell Telephone Company of Philadelphia operates in the city of Philadelphia only.

Delaware is served in the extreme northern portion by the Delaware & Atlantic Telegraph & Telephone Company. The rest of the state, together with a few counties in Maryland and Virginia, comprises the field of the Diamond State Telephone Company.

Maryland and the District of Columbia appertain to the Chesapeake & Potomac Telephone Company, and Virginia, North Carolina, South Carolina, Georgia, Florida and Alabama to the Southern Bell Telephone Company.

Ohio has two companies, the Cleveland Telephone Company and the Cincinnati & Suburban Bell Telephone Company, which handle business of their respective cities and the suburbs. The Central District & Printing Telegraph Company has a few exchanges in the southeastern section. The Central Union Telephone Company operates in the remainder of the state. In Indiana, the Chicago Telephone Company operates a few exchanges in the extreme northwestern part, and the Cincinnati & Suburban Bell Telephone Company several in the southeastern corner. The Cumberland Telephone & Telegraph Company operates the most southern counties of the state, and the Central Union Telephone Company the balance. With the exception of a few exchanges operated by the Bell Telephone Company in Missouri and the Cumberland Telephone & Telegraph Company, the Central Union Telephone Company handles all of Illinois, except Chicago and its suburbs, the latter territory belonging to the Chicago Telephone Company.

The Michigan State Telephone Company operates in Michigan, and also has several exchanges in Wisconsin. The Northwestern Telephone Exchange Company and the Duluth Telephone Company likewise have small territories in Wisconsin, but the major part of the state is handled by the Wisconsin Telephone Company.

Kentucky, excepting two very small sections, belonging respectively to the Cincinnati & Suburban Bell Telephone Company and the Central Union Telephone Company, is handled by the Cumberland Telephone & Telegraph Company. The same company takes care of Tennessee, Mississippi and Louisiana. In West Virginia the Chesapeake & Potomac Telephone Company operates the northeastern part, the Central District & Printing Telegraph Company the northwestern, and the Southern Bell Telephone Company the remainder. Duluth and suburbs belong to the Duluth Telephone Company, the balance of Minnesota to the Northwestern Telephone Exchange Company. Nebraska and a small section of Iowa, adjacent to Council Bluffs, are in charge of the Nebraska Telephone Company, the Iowa Telephone Company taking care of the remainder of Iowa. Kansas and Missouri are operated by the Missouri & Kansas Telephone Company, excepting the city of St. Louis and surrounding territory, which are in the care of the Bell Telephone Company of Missouri. In Indian Territory and Oklahoma the Pioneer Telephone & Telegraph Company is found. The territory of the Southwestern Telegraph & Telephone Company is Arkansas and Texas. North Dakota and the southeastern part of South Dakota are operated by the Northwestern Telephone Exchange Company, the Nebraska Telephone Company having a number of exchanges in the western part of the latter state.

Colorado and New Mexico belong to the Colorado Telephone Company, and Montana, Utah, Wyoming, most of Idaho and a small part of eastern Oregon to the Rocky Mountain Bell Telephone Company. Washington, part of Idaho, almost all of Oregon, Nevada and California comprise the territory of the Pacific States Telephone and Telegraph Company. The Bell Telephone Company of Canada operates in the Dominion of Canada.

A controlling interest in practically all of the above companies is held by the parent monopoly, the American Telephone & Telegraph Company of New York.

PLEADING GUILTY BY TELEPHONE.

When Justice H. F. Wieman of Kansas City, Mo., took down the receiver of the telephone in his office recently he was surprised to hear:

"Judge, I want to plead guilty to the charge of assault you have against me. I haven't time to go into court, so I want you to accept my plea and fine me by telephone."

The defendant was George Harman of Sheffield, a Kansas City suburb, who was charged with striking Mrs. James Wilkinson, a neighbor.

"How much ought I to fine you?" asked the court.

"Oh, any old thing. I'm not exactly guilty of the charge, but I want to get rid of it."

"All right; I'll fine you $1. The costs are $3.15. Come in and settle as soon as you can."

DECISIONS AFFECTING TELEPHONY

By Gilbert W. Hand

INJURY FROM ELECTRICITY TO ONE NOT IN EMPLOY OF DEFENDANT.

THE facts in a recent New York case involving the above question were as follows: A line-man was in the employ of the Hudson River Telephone Company and at work on a pole owned by an electric railroad company not a party to the suit. Near the top of the pole was a cross arm supporting a wire belonging to an illuminating company which had inadequate insulation or insulation which was out of repair. This wire at the time was carrying a powerful current of electricity. Below this cross arm was a bracket carrying a wire of the telephone company. The lineman was set to work to transfer the telephone wire belonging to his employer from its bracket to a cross arm placed upon the pole at a point above the illuminating company's wire. While engaged in this duty he came in contact with the wire of the latter company above referred to and received a shock of electricity which caused his death. The case has been before the New York supreme court on the question of the right of action against the illuminating company. We quote the following excerpts which are suggestive of the liability in such situations: "As to the illuminating company, the deceased was upon the pole and engaged in work upon its wire either as a licensee or trespasser. In either event the illuminating company owed him no active duty. Larmore v. Crown Point Iron Company, (N. Y.) 4 N. E. 752. Each must be held to the exercise of reasonable care. Neither could rely upon the discharge of any active duty by the other. The deceased owed the duty to himself to exercise reasonable precaution. Did he exercise that care? I think he did not. . . . He was a man of mature age; he was employed in connection with wires carrying electricity. If he were injured because the insulating material was not intact, such defect was as apparent to him as the illuminating compnay. His point of contact must have been identical with the defective place in the covering. . . . Can it be said that a reasonably prudent man will intentionally put himself in contact with a wire carrying a deadly current of electricity, knowing that nothing stands between himself and its deadly power save a thin and flexible layer of insulating material liable to become impaired by exposure? . . . When a person purposely puts himself in contact with such a dangerous thing, he may not be indifferent as to whether its owner has or has not done all he ought to have done. He must be held to the degree of care that is imposed upon all persons who intentionally deal with dangerous things. In this case deceased must be regarded as knowing the purpose for which the wire was employed, the dangerous current conveyed by it, the liability of its covering becoming impaired by use and exposure or by coming in contact with hard substances . . . as running his own chances when he put himself in contact with it without taking any active measures to determine its actual condition." The conclusions above noted must be limited to the case at hand and would not be in point in a case between a master and his own servant. However, as to the action against the illuminating company the above ruling debarred deceased's representatives from maintaining the suit.

Mangan v. Hudson River Telephone Company, 100 N. Y. Supp. 539.

PUNITIVE DAMAGES FOR TRESPASS IN ALABAMA.

A case in the above named state in which the Western Union Telegraph Company was a party arose over certain alleged breaking and tearing down of fences while erecting its lines which the plaintiff relied on to maintain an action for trespass. The only point of interest to readers of TELEPHONY is the ruling of the court that if it were found that such acts were sufficient to warrant the conclusion that they were wanton or reckless, that exemplary or punitive damages could properly be awarded.

Western Union Telegraph Company v. Dickens, 41 Southern, 469.

ADDITIONAL SERVITUDE BY REASON OF PLACING POLES ALONG MARGIN OF HIGHWAY—RULE IN ALABAMA.

The supreme court of the above state has had occasion to lay down the rule to be applied in this commonwealth on this question, and owing to the careful reasoning and final conclusion which we deem to be in harmony with the majority of the courts, we shall quote the greater part of the opinion: "The rights of abutting owners, and the question as to what is or is not an additional servitude, have furnished material for a vast number of conflicting decisions, so numerous and so conflicting that it would extend an opinion beyond all reasonable limits to attempt an analysis of them, yet a careful examination of them will show a gradual development of the principles of the law, in order to accommodate them to the progress of events and the onward march of civilization. Thus, even in as late and excellent a work as that of Judge Dillon on Municipal Corporations, the rights of surface railways on the streets, and the question as to whether they constitute an additional burden, are spoken of as unsolved problems. . . . In a second note the then recent case of Taggert v. Newport Street Railway Company (R. I.), 78 L. R. A. 205, is quoted to the effect that an electric street railway, with its poles and wires, was not an additional servitude. On this subject a recent writer states that the judgment of 'substantially all of the courts of last resort in the United States' except New York, is that the 'ordinary electric street railway with trolley wire,' etc., is not an additional servitude; Nelis on Surface Railroads, pp. 134, 135. So on the subject of erection of poles for electric lighting, on streets, after some contrary decisions, the evident necessity is so great that it has come to be generally understood that it is not an additional burden, though there still remains, in the decisions and textbook writers, the impression that it is saved by the fact that the light companies generally light the streets as well as private dwellings. . . . Other writers have also called attention to the fact that the streets are constantly used for fire plugs, fire alarms, and other things necessary for the protection and good order of the city; yet no court would for a moment entertain the idea that they are an additional burden for which the abutter could claim compensation. The last named writer we think suggests the practical solution of these matters, when he says: 'It does not follow that the landowner is without redress, if poles be put up so as to interfere with his access, or even so as to be inconvenient and unsightly, or if wires be strung so as to be dangerous, or so as to prevent ready access in case of fire.' Keasly on Electric Wires, p. 139. 'It might tend to a reconciliation of the cases and the adoption of a uniform rule, if the question of a new burden were left on one side, and the attention were called to the practical question whether or not the rights and privileges of the abutting owner . . . were affected.' 'When the property is taken for a public road or street, although technically the fee remains in the abutting owner, yet he cannot interfere

with the surface, and it would seem that practically an additional burden, such as would justify an action on his part, should be something which interfered with or made inconvenient his enjoyment of what remained to him in the land. As to obstructing the road, that would be a matter in which he had no greater right than the public generally, but if the new use impaired his proper use of his own property, in any manner, then, if it could be said to be a use not intended to be included within the original grant, it would be a matter for which he would be entitled to compensation.'" The court accordingly held that the use of highways in this state by telephone companies is not a use that requires additional compensation to the abutting owner except under special circumstances.

Hobbs v. Long Distance Telephone & Telegraph Company, 41 Southern, 1003.

GUY WIRE ATTACHED TO BARN WHICH BURNED IN ELECTRIC STORM—COMPANY HELD LIABLE FOR LOSS.

An interesting case from the Maine courts suggests a peculiarly dangerous condition of affairs which is allowed to exist by many companies and the consequent danger of paying large damages from their maintenance, all of which could be easily remedied. One of the telephone poles of the Northeastern Telephone Company stood about five feet from the northeast corner of a barn belonging to one Edith E. Wells. This pole was guyed to the barn by means of a piece of ordinary wire. There was no lightning arrester or other appliance connected with this guy wire or with the telephone wires in the vicinity to divert electricity to the earth during thunderstorms. The plaintiff claimed that lightning struck the main line of the defendant's wire some distance away and was conveyed over the main wire to her barn, causing the fire and the loss of her property. The company contended that the lightning struck the barn direct and communicated the fire in this manner rather than through the guy wire. A cracked board from the corner of the barn showed that it had been hurled off by the shock from whatever source it came. There was much effort by the respective parties to determine the tendency of lightning to pass from telephone wires off to adjacent objects; the owner of the barn had two witnesses who gave testimony that in their judgment the lightning was conveyed over the guy wire, several for the defense were just as positive that the bolt first struck the barn. There was nothing more than speculation by any witness on the question of how the electricity did in fact set fire to the barn or how it got into the barn in the first instance. There was some positive testimony that a lightning arrester would have prevented the accident. On this testimony and the further circumstance that a piece of the corner of the barn was splintered was sufficient in the court's opinion to charge the company with damages for the value of the barn. The case is unusual in that there was no positive testimony other than mere theory that the electricity which set fire to the barn was conveyed over the guy wire and the judgment therefore finally rests on the conjecture that such fact did exist without the same being definitely proven. It was undoubtedly negligent for the telephone company to maintain a guy wire to a building in this manner, but this could not be the proximate cause of the damage until it was satisfactorily shown that the current passed over the guy wire. The application of the decision is apparent and we suggest the propriety of seeing to it that such conditions are speedily removed wherever the same now exist.

Wells v. Northeastern Telephone Company, 64 Atlantic, 648.

TELEPHONE MEN MEET AT IRONTON.

A meeting of Ohio telephone men was held at Ironton, Ohio, on November 19. H. P. Folsom of Circleville was chosen chairman and stated the object of the meeting was to give better telephone service. He referred at length to the Indpendent movement in Ohio, and cited numerous instances to show the rapid growth this movement has had. He said its main object was to get the people closer together, thereby benefitting all in matters of trade and general convenience.

W. T. Cox spoke on the needs of the country exchanges. Other speakers were H. A. Marting, F. L. Beam, D. E. Sapp, H. B. Mauck, L. D. Taton, Lon Hutchinson, John Keys, R. A. Knapp, John Ainsworth and others. A committee consisting of R. A. Knapp and W. T. Cox were appointed to present a plan for the perfecting of a permanent county organization. The following are the delegates named by the committee:

Ironton, R. A. Knapp; Burlington, John Banks; Getaway, W. T. Cox; Proctorville, L. D. Eaton; Scottown, Nat Burcham; Wilgus, E. M. Hamilton; Rock Camp, Jno. G. Keys; Waterloo, J. T. Vermillion; Lecta, Elmer Massie; Millers, Dr. L. A. Williams; Kitts Hill, F. L. Kitts.

The committee recommended that a meeting be held some time about the first of the year.

After the business session a banquet was tendered the visiting telephone men and the business men of Ironton by the Home Telephone Company. Over a hundred attended the function which was thoroughly enjoyed.

MICHIGAN MANAGERS TO MEET.

On November 15, a committee of gentlemen met at Grand Rapids for the purpose of completing arrangements for the formation of an association of Independent managers of Michigan. This project had its inception at the annual meeting of the state association, at Ann Arbor last spring, and was so favorably thought of that at the annual convention of the Citizens' Telephone Company's managers held in Grand Rapids May 11 last, to which four outside managers were invited, this committee was appointed, and they have since been working out the project. The object of this association is to promote the best methods of the telephone industry along operating, maintenance and technilines.

There has been a general meeting for all managers of the state, called for Dec. 11, 1906, to be held at the building of the Citizens' Telephone Company, at Jackson, at which time it is hoped to complete the organization of the association.

The following gentlemen constitute the committee, and have been actively engaged in this work: Wm. Robinson, chairman, general manager Citizens' Telephone Company, Muskegon; H. T. Clough, secretary, district manager Union Telephone Company, Owosso; A. A. Burch, district manager, Citizens' Telephone Company, Battle Creek; H. H. Hutchins, secretary Saugatuck & Ganges Telephone Company, Fennville; C. G. Kehoe, manager Citizens' Telephone Company, Jackson; F. V. Newman, assistant to general manager Citizens' Telephone Company, Grand Rapids; Mr. F. M. Howard, assistant general manager Valley Telephone Company, Flint.

Every general manager who has been approached on the project has given it his unqualified support, and it looks as though the association would start off with good prospects and it certainly has a field wherein it can do much good.

CEMENT-COVERED TELEGRAPH POLES.

Experiments which were made in India some three years ago in covering wooden telegraph poles with cement, put on in a thick coat over wire netting securely fastened to the pole, are said to have been satisfactory, and to have afforded absolute protection against that pest of tropical countries, the white ant.

THE EVOLUTION OF THE TELEPHONE

Abstract of a Paper Read Before the Maritime Electrical Association at Sidney, Australia

By J. H. Winfield

IT IS my purpose to sketch as briefly as possible the various changes and improvements in telephone apparatus which have made it possible for the telephone to become such a necessary factor in the social and business life of the world to-day. I shall also endeavor to convey to you an idea of the enormous development of the telephone business which has already taken place, particularly during the past few years, and the possibilities which still lie before us.

The telephone was first invented by Bell in 1876. Contrary to the idea of most persons to-day, it consisted solely of what is now known as the receiver. It is possible to use the receiver as a transmitter. By first speaking into this instrument and then quickly placing it to the ear, it was found possible to carry on conversations over short distances when two instruments were connected by a pair of wires. It was soon discovered that one wire could be eliminated and the earth used as a return as in telegraphy. The limiting distance of speech was, however, very quickly reached owing to the extreme feebleness of the current generated when speaking into this magnetic telephone.

The problem was then to discover some kind of an instrument which would develop a heavier current so that it could be transmitted to greater distances. The problem was solved by the invention of what is known as the carbon transmitter. The most common form of this instrument in this country is what is known as the Blake transmitter. This instrument, instead of generating the current in itself as the magnetic telephone did, is operated by a cell of primary battery, the transmitter merely serving to vary the intensity of the current corresponding to the various sound waves falling upon its diaphragm. This, of course, was a long step in advance.

Up to this time the telephone had merely been considered as a toy, but now the idea of a central exchange to which a number of wires leading to various points were terminated by telephone instruments was introduced. In order to get a message through, however, you had to call central, who took the message and then repeated it to the person for whom it was intended. It was not long, however, before some ingenious person discovered that it was possible to connect two lines together and let the parties carry on their own conversation without the intervention of central.

This marks the beginning of our present central office switchboard system. The first boards were very crude affairs, arranged somewhat on the principle of the Western Union peg switch. Improvements, however, followed each other in quick succession, until what was called the standard switch was evolved. This consisted of annunciators arranged to expose a number when the subscriber rang his bell, and jacks, forming the terminals of the various lines, which were connected together when required by means of flexible cords with a plug on each end, each cord having a key by means of which the operator could listen in or send a ring either way.

In large offices a new difficulty soon arose. An operator could only reach about three feet on either side of her, and as the standard switchboard occupied about two feet in length for each one hundred subscribers, about five hundred lines seemed to be the limit of size of such a type of switch. This difficulty was eliminated by providing trunk wires ending in jacks from each operator to every other operator. Calls for points beyond the reach of an operator were then switched on to one of these trunk lines leading to the section of the switchboard near which the jack of the desired line was placed, the switching being completed by the second operator with a second pair of cords.

The objection to this method of operating was that it required two operators to make a connection, and it was costly, cumbersome and expensive. In addition to this, there was considerable liability of error, owing to the number having to be transmitted through a second person. Owing to the growth of business, this system was soon outgrown, as it was found that a thousand subscribers were all that could be properly handled even with the trunking system.

The next great step was the invention of the multiple switchboard, which took its name from the fact that each line was multiplied to a number of points on the board so that it was within the reach of every operator. The boards were divided into sections about six feet in length, each section accommodating three operators, who had a certain number of terminating lines and annunciators, depending on the traffic, the number being so arranged as to keep the operator fully employed, but not overloaded. Above the jacks of the terminating lines were placed the multiple jacks, there being one multiple jack in each section for every line coming into the exchange, and the sections being only six feet in length, it was quite possible then for each operator to reach every line. Of course this system was very expensive, as on a board of say ten sections, it meant eleven jacks and a large amount of cabling, instead of only one jack. But the cost was easily offset by the immense superiority of the service.

This multiple arrangement necessitated the operator to ascertain whether any particular line was in use by another section so as to prevent another connection being made when the line was already in use. This result was accomplished in several ways, one of which was to place a metal ring in front of each jack connecting all the rings of one set of jacks together. When a plug was placed in a jack, a battery current was thrown on to the ring, making all the rings on that particular line alive. Any operator having a call for that particular line would touch this ring with the tip of her plug, and if the line was in use, she would get the battery click in her receiver, otherwise there being no sound she would push the plug right home and call the party desired.

While these improvements were being made, other improvements were being worked out in the instruments and lines. The original grounded lines soon became noisy, owing to the introduction of trolley cars, etc., when it was found that a quiet line could be obtained by going back to the first principles, and using two wires for the circuit, cutting out the earth return. The Blake instrument was superseded by the long distance or solid back transmitter, which is a much more powerful instrument and can be used on very long distances, whereas the Blake was of very little use for a distance of over one hundred miles. The Blake transmitter also caused some trouble owing to getting out of adjustment, which is entirely obviated in the solid back.

The gradual growth of the exchanges soon began to load up the poles with wires much beyond their safety limit. Then it was necessary to use cables, which passed through varying improvements, until what is known as the Conference Specification was reached, which consists of pure copper wire insulated with wraps of dry paper, two wires

of a pair being twisted together, the whole being enclosed in a lead sheath hermetically sealed in order to prevent the entrance of moisture. The use of cables, of course, cleared the poles to a very large extent, but before long they became congested with cables and then it was necessary to go underground.

Many systems of underground construction have been successfully used, but the favorite seems to be a hollow tile laid in cement or concrete. This is practically indestructible.

These improvements bring us down to about 1900, when another great step in advance was made by the introduction of the common battery or central energy system. This takes its name from the fact that the energy for operating the transmitter is supplied from a storage battery at the central office, instead of from a primary cell in each instrument. The same current is also used for signalling the operator, thus doing away with the small magnetic generator in the telephone instrument. Another great advantage of this system is that the battery supply is always constant, whereas with the primary cell it begins to deteriorate from the moment of its installation.

Another feature is that central is called by merely taking the receiver off the hook, thus reducing the labor on the part of the subscriber and making the signal automatic. This is accomplished by placing a condenser in seres with the ringer in the telephone, which is cut out when the switch hook goes up, permitting the battery current to flow over the line and operate a relay at the central office, which closes a local circuit, lighting a small electric lamp on the switchboard, which is placed directly over a terminal or answering jack of the line. This lamp takes up very much less room than the old annunciator, and thus permits more multiple jacks to be placed within the reach of each operator, increasing the capacity of the switchboard. On a large switchboard it has been possible to mount the multiple jacks on three-eighths inch centres, bringing from fifteen thousand to twenty thousand of them within the reach of each operator.

A very important feature of the central energy system is that the operator is enabled to determine the exact condition of the line at any time by observing the action of two small lamps placed in the cord circuit. The method of connection is as follows:

The subscriber taking down his receiver operates a relay in the central office, which lights a lamp in front of the operator. The operator puts one of her plugs in the jack, which operates another relay, putting out the lamp. She then throws her switching key on to the cord circuit, ascertains from the subscriber the number of the party wanted, then takes the other plug belonging to the same pair of cords and taps the ring of the jack called for. If she gets a click, she reports "line busy." If no click is heard she pushes the plug right home and presses her ringing button. The connection is then completed. The lamp attached to the calling cord lights as soon as inserted in the jack, and remains in this condition until the subscriber answers, when the lamp is extinguished. As soon as the conversation is completed the subscriber hangs up his receiver and the lamp again lights, so that the operator is at all times in possession of complete information as to what is going on over the line, without the necessity of cutting in and asking unnecessary questions. It also enables disconnections to be made very rapidly, and has improved the efficiency of operating very materially.

The solid back transmitter only required a very slight modification to allow of its being used on the central energy system. The receiver remains to-day practically the same as when first invented. Of course improvements have been made in the mechanical features, but the electrical part remains absolutely the same with the exception that the original bar magnet has been replaced by one of the horse shoe type, giving a stronger magnetic field and a somewhat more sensitive instrument. By eliminating the magneto generator and battery, the subscriber's set has been made much smaller and neater.

The telephone has been one of the greatest features in the development of modern business conditions. It might be said that the modern "sky scraper" or office building would be hardly possible without the aid of the telephone. Some of the buildings contain from 500 offices up. Each of these offices has a telephone, some of them two or three. Each of these telephones is used on an average of twenty times per day at least, which would amount to a minimum of 10,000 calls to and from such a building per day. If these messages had to be handled by messenger boys as in the old days, assuming that each boy would carry 100 messages (certainly a large number), it would take 1,000 boys, which would crowd the streets and elevators, and absolutely prevent any other traffic from being carried on. Yet the unobtrusive telephone on the wall or the desk does all this work quicker and more correctly, and at an infinitesimal part of the expense.

It is estimated that the telephone development will not slow up until there is at least one telephone to every fifteen inhabitants, or three times as many as at present. Some optimistic individuals go as far as to state that the development will be brought to one to every five inhabitants, but this is perhaps too much for us to look forward to. for a long time at least.

One of the most important advances in recent years is the private bench exchange system. This is a name given to a private telephone system connected with the main exchange by means of various trunk lines. It is used very successfully in factories, warehouses, departmental stores and all large concerns. The switchboard is installed with lines running to telephones in various parts of the building. As many telephone wires as are necessary run from the switchboard to the central office, so that in addition to the intercommunicating features of the system, it is possible to talk from any instrument to any part of the city. By employing an operator, it is possible for her to sort out the calls coming in so as to put them on the proper department without any waste of time.

In one case that came under my notice very recently where a large wholesale firm had been persuaded, somewhat against its wish, to install a private branch exchange, a short time afterwards the manager stated that it was the best thing on earth, and whereas previously he had to answer the telephone 50 or 60 times a day, now he only answered it eight or ten times, just when he was actually required. Before he was simply doing the work of clerks and office boys, consequently the saving of his time alone was more than sufficient to pay all the cost of this system.

One possibility of development which has heretofore been neglected is that of placing what are termed "extension sets" which are subsidiary sets to the main instrument, enabling calls to be answered whenever an extension set is placed. This has been used to some extent in offices where the main instrument would perhaps be placed in the outer office, an extension set being put on the manager's desk, enabling him to make or answer a call when required without leaving his desk.

But the field for this instrument is a very much larger one than this. Why not a telephone in every room in your house, so that when you are called you can answer without going up or down stairs? Of course most people will object to the expense, but through the introduction of a new form of instrument, it is found possible to install an extension set in a house and make a fair profit at as low as fifty cents per month in some cases, and there is hardly any person who could afford a telephone who would not be willing to pay that much additional for at least one extra set, say to be placed upstairs, with the main set downstairs.

I have not touched on the long distance business, as it really requires a paper to itself. It is sufficient to say that the limiting distance of such was formerly 100 miles, and has been extended so that commercial business is now being done over circuits of 1,500 miles.

One feature not usually considered by persons in discussing this matter is that the telephone day is very short on the long distance lines, nine-tenths of the business being handled between 9:30 a. m. and 4:30 p. m. In long circuits running from east to west where the difference in the time might be two or three hours, this day would be still further shortened, necessitating a very high rate in order to make such an investment pay.

This is one of the features that will be very much against telephone connection across the Atlantic, if we should ever reach the point where it could be carried out from an engineering standpoint. The difference in time being four hours, the length of the telephone day would not be more than three or four hours. Of course, the longer the circuit, the heavier the copper required to construct such circuit, in order to give efficient service, consequently theoretically all lines over 400 miles in length should charge a higher rate per mile than those under that figure.

The reason the limit is placed at 400 miles is that No. 12 Standard gauge copper is about the smallest wire that can be used from a mechanical point of view, and as this wire is good for circuits of 300 or 400 miles, a certain rate has been fixed for this. Over that distance heavier wire has to be used, and consequently a higher rate should be charged. The people on the other hand insist that the further they go, the cheaper they have to get it pro rata.

Composite telephony and telegraphy has been tried and is to-day being used on very many of the American Telephone & Telegraph Company's lines. This enables the company to earn a double revenue, one revenue for the telephone and the other for the telegraph, consequently they are enabled to give the telephone service at the 400 mile rate and still earn a dividend, owing to the extra receipts from the telegraph service.

THE DOUBLE TELEPHONE NUISANCE.

Our Bell friends are wasting a great deal of sympathy on the poor business man, who has to have two telephones installed in order to obtain connection with everybody in town and also in order that he might have a duplicate service in case one line or instrument should be out of order, says the Telephone World. But the Bell companies are not always consistent, viz., in some places they take particular pains to remind their customers that the telephone is a door to their place of business and that if one door is not enough, they should have more, either by having another circuit or two, or expedite their business by the use of a private branch switchboard.

In this case, they evidently try to impress the poor double-telephoned, business man that if one telephone is a good thing, two or three are better. Now, it is notorious that the Bell companies never develop their territory where they have unrestricted control, and the poor overworked business man has only the privilege of talking to a very few people. When everybody in town, by means of competition, has a telephone and the business man can make connections with from four to ten times as many people and the Bell company has only one-fourth of the telephones, then we begin to hear a great deal about the double telephone nuisance. Well, all we have to say is that if two telephones are a nuisance, the business man should throw out one and keep the other, or at least use the one that affords him the best service and the largest number of subscribers, which decision in nine cases out of ten, would be in favor of the Independent companies.

The cry against the double-telephone "nuisance" comes with rather poor grace from those who are on the under side of the fight. Once in a while some business man will be found who thinks that any kind of a telephone is a nuisance, but he must keep them anyhow. Well, he has our sympathy. If he didn't have two telephones at a net cost of $75.00 a year, he could get along first rate by hiring some extra clerks and messenger boys at a cost of say $1,200 to $3,000 a year.

Circulars of inquiry sent out by boards of trade and other associations have, as a matter of fact, found the business men of cities and towns where competition exists in favor of the competitive system by a very large majority, for they realize that their complaints receive attention, that the systems installed are better, that charges are moderate and service prompt. Until the present generation of business men dies out, the rotten service given by the Bell companies in almost every section of the country will not be forgotten; too many business men remember only too well what they formerly had to put up with.

SOME GOOD RULES.

In every department of the large retail store of Marshall Field & Company, Chicago, the following notice is conspicuously displayed:

"The manner in which a person uses the telephone indicates his character to a great extent and makes either a good or bad impression, and this impression is reflected directly upon the establishment from which such a message comes.

"It is a pleasure to do business with a house which performs every detail in a clean-cut satisfactory manner; but it leaves a sting to be answered abruptly or discourteously over the telephone. It is folly to lose one's temper because one does not get immediate connection. This is rarely ever the fault of the telephone operators who are nearly always courteous and prompt.

"When one is called to the telephone he should respond quickly, and the person calling should not be left to hold the wire too long, something decidedly irritating and often unnecessary.

"Let us throughout the whole house strive to excel in satisfactory telephoning."

TELEPHONE IN POLITICS.

In a discussion of the changes that have come over the old plans and methods of political campaigning, the New York Evening Post remarks: "Prompt and immediate touch with the people is one object of the bulletin plan. The increased use of the telephone brings about an even further advance in this respect. It is time for some one to write a book, or at least an article, on "The Telephone in Politics." The telephone alone has made it possible for one man to manage a campaign over an entire city. It has curtailed the functions and responsibilities of a district manager as the cable has those of an ambassador. It enables a canvass to be made or a list of distinguished signatures secured for some 'call' or manifesto, without the expenditure of several days' time or the employment of a large corps of workers.

TELEPHONE AND THE FARMER.

The value of the telephone in business was well illustrated during the recent sensational advance in both the future and spot cotton markets. When the advance came the farmers were at once informed by telephone, and they in turn got in connection with the buyers in the cities. Through the medium of the telephone thousands of bales were sold, which were to be delivered in the cities within the next few days. The next day came a slump in prices, and the farmers were ahead many thousands of dollars. Under the old way of trading they would have had to rush the cotton to market in wagons, and it would have reached the buyers too late to get the advantage of the advance.

CONVENTION PAPERS

SMALL EXCHANGES.

THE small exchange, such as is used in towns or localities furnishing 500 subscribers or less, is a subject which at this time is occupying the minds of engineers and operators possibly more than are exchanges of larger sizes, from the fact that in large cities, where the revenues are sufficient to guarantee large expenditures, the exchanges, as well as the construction, are planned upon a broad basis, while small exchanges require careful consideration of the smaller details, because the revenue is less in proportion to expenditure.

In small exchanges we are required to run greater distances to reach subscribers, due to the fact that the surrounding or rural territory must be taken into account in order to give an interchange of service between business men of the town and those with whom they do business in rural districts.

The kind and class of service must be up-to-date and interchangeable with trunk line service to the large city exchanges, as well as between all other small exchanges in adjoining territory. These conditions require that both exchange equipment and line construction must be up to standard or the exchange of service is poor and unsatisfactory, which produces discontent with the subscriber and eventually a withdrawal of his name from the subscribers' ledger.

The small exchange manager will find it impossible to continue an increase in business unless his subscribers are satisfied with service given.

It will now appear that, first of all, the exchange equipment must be of such a character that it will give up-to-date service locally, and also work in harmony with trunk line service to the best equipment of large city exchanges, and it is self-evident that in order to do this the small exchange switchboard equipment must be of the best and the construction of all of its parts must be just as substantially made as the best of larger exchanges. Experience has proved that small exchanges built and installed without a high grade of equipment, or with a low grade of insulation resistance, soon become practically in-operative in connection with trunk lines and the larger exchanges, which in many instances, on account of the inferiority of small or suburban exchanges, have been the means of general dissatisfaction of all subscribers on the city exchange, because of poor service to suburban territory.

The writer would recommend as much care in the installation of small exchanges as is exercised in exchanges of large cities, and would especially insist upon having all materials of the best, requiring as high quality of insulation resistance as can be secured, and having all parts of the equipment standardized, so as to operate in connection with the parent exchanges, as though they were a part of the same exchange.

It is not intended to convey the idea that suburban exchanges must contain the same equipment as the larger ones, but it is claimed that, while the signaling and supervising can be obtained by any convenient method, the transmission conditions can and should be the same, and that whatever apparatus is used it must be standardized with the mother exchanges.

The exchange equipment, while a necessary part of a system, does not constitute the whole system, for it is of equal importance that the construction work, including cables, open lines and installation, be looked after and accomplished with the same degree of perfection as is used with equipment, because any system is only as good as its weakest point. It would, therefore, be folly to exercise special care on exchanges and leave the cable or line insulation in poor condition.

Just here comes the question of maintenance, which is the one account that eats up all the profits and gets its dessert or pie from the stockholders' pockets or allows the investor to be benefited by his investments.

The elements are great factors to be considered in maintenance, as it is from wind, storm, sleet or some combination of these conditions, that causes such destruction to construction work, as to require large maintenance accounts.

Cables underground cost more money than open line wires, but cables underground and properly protected will not cost near so much to maintain as open wires, nor are they as liable to disturbing conditions which affect transmission. So, as a whole, the writer would recommend the use of underground cables in all places where it is permissible by expense and revenue.

If there are no high potential lines to contend with, an aerial cable for twenty-five lines or more can be used to good advantage, but if there are trolley or lighting lines near the telephone route, it will be much cheaper in the long run to put all cables underground. It is also necessary to protect the cable with good lighting protectors as well as heating coil fuses, because it has been proved, and is still being demonstrated, by a number of small companies that a large percentage of cable trouble is caused by lightning entering cables that have not been properly protected, or from sneak or other foreign currents that would be avoided by the use of proper heating coil fuses. Let us assume that a cable properly installed having a high insulation resistance will remain in the same condition until interfered with; then, if we can protect it in such a manner as to keep it in its original condition, there will be practically no maintenance on cable excepting at the boxes.

Cable makers will furnish any interested parties sufficient information to prove that cables are seldom over protected, but are most always under protected, and many times what is used as a protection is really conducive to additional troubles. The fact that cable men are continually going over cables is conclusive proof that there is something wrong either with the installation or protection of a cable, from conducted currents or electrolysis.

Where it is necessary to build distributing pole lines they should be constructed of a good grade of chestnut or cedar poles to be not less than seven inches diameter at the top, and not more than thirty-five feet long, excepting for special purposes, as the shorter the pole, the less liable to storms' destruction, and a thirty-five foot pole is high enough for all ordinary purposes.

The writer has found that poles set not more than one hundred and ten feet apart, and fitted with good arms, have stood storm tests admirably.

It has also been proved that wires of number 10 B. & S. gauge put upon double petticoated pony insulators, on thirty-five feet poles of 110 feet settings, have stood all kinds of weather conditions without damage unless caught by trees or other foreign objects thrown on them by the elements.

It has also been computed that the expense of construction checked against cost of maintenance of such a line as here mentioned about reaches the point of economy from which it is recommended that lines of this nature be accepted as standard construction for pole line distribution.

The installation of instruments is an important factor in connection with every plant, but as it is not intended to cover this part of the system in this paper, we will not do more than give it this mention.

The operation of any plant, be it small or great, is the all important factor with the investor, as it is from this sheet of accounts that he sees good or evil forebodings.

The superintendent of small plants must be general manager, engineer, traffic manager, construction superintendent, and, in fact, everything in one, and it is not every man who possesses all these qualifications, hence the fact that so many small companies get into trouble in a few years. It would be much better for small districts to join together in the formation of an association or operative company of sufficient magnitude to warrant the employment of special talent to manage the different departments. However, some small exchanges must exist and be operated.

It is necessary to secure employes who are pleasant and congenial; those who help to build up a business instead of destroy it.

Then, it is necessary to watch the expenditures very closely to see that the revenues are not eaten up, and by all means to see that each and every subscriber has efficient and satisfactory service. The lines and instruments must be kept clear of all troubles, so that interferences will not occur, for there is nothing that will create adverse criticism sooner than inefficient transmission.

The manager must be willing to meet his customers half way in the adjustment of difficulty and not assume a dictatorship over his patrons.

Upon the whole, it is a business proposition and will respond to policies the same as all other business enterprises.—*A paper read by Charles Russell before the Pennsylvania Independent Telephone Convention at Allentown.*

STANDARDIZATION.

It has been conceded that the central and western states have always been in the lead in Independent telephony, and the question of adopting a standard as to construction methods is one with which the respective state associations have frequently had to deal, and the subject has been brought up a number of times before the National convention. The National committee has made considerable headway along the lines of a report on the standardization of construction and apparatus, but as yet nothing has been officially adopted by any of the associations. The New York state association should aim to actually accomplish something along these lines by providing that the apparatus used and construction done in the Independent systems throughout the state shall be such as to give the most efficient service possible and at the same time materially enlarge the public appreciation of anti-monopoly conditions.

In the matter of toll service, the weakness of the Independents has not been in the territory they cover, for one is able ordinarily to talk as far as he requires; not in the rates, for they are liberal;

not in the quickness of service, for with the customary Independent hustle, calls are sent through with all possible haste; but in the fact that one has oftentimes to go through several types of switchboards and various styles of line construction to reach the person with whom he desires to speak, and when the connection is secured, the service is not as good as it should be because of line and switchboard resistances, leakage and various other causes.

To illustrate, we will say that it is our desire to talk with our well-known and versatile friend J. Doe, who at the present is residing in Ruralville. We remove our receiver here and, talking over a good copper circuit, state our wants to Miss Toll Operator. She, in turn, calls Adjacent Town, over a copper circuit built along the most rigid lines of proper toll line construction.

Adjacent Town is a magneto system, entirely metallic, and "comes up" fine. Here we are plugged on to the line running to "Somewhere Else," which happens to be of the McCluer or common return type. Business is good in "Somewhere Else" and as a result, the "Commons" are a trifle overloaded, and it is here we notice some cross-talk.

Notwithstanding the busy condition of affairs in "Here" the operator is obliging and hastens to switch us on to the line for "Near-by-ville," where we strike a grounded bridging system, which by itself isn't so bad, but on a toll deal—well!

When the drop falls in "Near-by-ville" the operator cheerfully plugs in, and, ascertaining our desire, at once connects us with "Ruralville."

Now, when the Ruralville system was started there was none too much money in the treasury and economy of construction was the main consideration, so when "Mr. Sleek Salesman," representing the "Don't Care for Our Reputation Company," came along and showed them how they could build a series grounded system at about one-half the cost his competitor was advocating for a bridging metallic system, they patted his back and gave him the order.

Therefore when we finally got our childhood chum on a grounded series line on which there are only six other instruments, the conversation that ensues greatly resembles a combination between an ax on the grindstone and grandfather's coffee-mill.

With us, who know these things, allowance is made, but with Mr. Businessman, who is laying down his good "hard-earned," excuses don't go. What he wants is talk, good plain talk. He wants to do it himself, too, and not through the medium of some operator who obligingly offers to repeat for him. And, bear in mind, that one conversation of the nature outlined can do more toward killing your toll business than all of the low rates your monopolistic neighbor can offer in a year.

The primary consideration in exchange operation is service, for upon service does all else depend. Upon the service does the success or failure of the company depend. The subscription list varies according to the service given. Poor service, poor patronage, poor dividends and vice versa. But the service does not depend entirely upon the equipment but the manner in which this equipment is used. Poor equipment may be used so as to give reasonably good service, and the very best of equipment, in the hands of the inexperienced or slothful, may in a short period run a company in such a condition that many liberal doses of standardization will have to be administered before we again see in it the semblance of a good healthy system.

The toll lines especially should be able to give the best service of any in the exchange, and, in order that this may be so, it is necessary that some standard of toll line construction be adopted and strictly adhered to.

In this connection, I would say that the long distance companies, who are of a necessity giving their time entirely to the construction of toll lines, would be much better able correctly to care for the toll business than others, and it is difficult to see why it would not be more profitable for the local companies to allow the long distance companies to handle the building of all long distance lines and to provide for them accommodations on their switchboards. This would assure all toll lines being constructed in a uniform manner, thereby giving the best of service, and would further allow the use of the time and moneys spent in this direction for the extension and betterment of the local systems.

These long distance companies should adopt a standard set of specifications for their toll line work, and the specifications such as they would naturally adopt would be an invaluable aid in the construction of local lines.

These specifications should cover: Right of way; route of toll lines; the locating of poles; the spacing of poles on straight lines; the spacing of poles on curves and corners: long spans, spacing of road crossings; railroad right of way; the height and diameter of poles; clearing of obstacles; railroad crossings; extension fixtures; spacing of cross-arms; cross-arm fitting; pins and fitting; distribution of poles; method of gaining poles; painting of poles; method of attaching lightning arresters on poles; method of attaching cross-arms; method of bracing cross-arms; stepping of poles; setting of poles; facing of cross-arms; reinforcing and guying poles; anchors and uses; the size and kind of wire to be used; the method of stringing wires; the sag of wires; the location of wires; the method of tying wires; the method of making joints; the method of dead ending; the method of transposing.

The specifications should also cover the method of a toll line entering an exchange so that the manner of answering toll calls and opening the line for test may be exactly the same at all exchanges.

Standard instructions should also be issued for the operators as to the proper handling of toll messages so that an operator accustomed to handling toll calls at any one board might be placed at any other exchange and know, without further instructions, that the manner of handling toll calls was exactly the same in each.

It would be well to have the operator become familiar with the parts of the switchboard, learning the names and functions of each, so that she might more intelligently perform her duties.

The instruction to operators should be general, but deal particularly in the handling of long distance business and should deal with: The proper method of handling an originating message; taking care of delayed calls and explaining the delay to the calling subscriber; the transmission of messages in the event of subscribers not being able to talk with ease; the timing of toll messages; the supervision of toll connections; the handling of outgoing calls; the handling of received calls; the handling of appointment calls; lost calls; reversed calls; the method of routing messages to the best advantage; day rates and night rates; the use of the repeating coil in connecting lines of dissimilar nature; the necessity of immediately reporting all trouble on toll lines; the proper clearance of circuits when messages are completed; on the passing of calls through an exchange; the method of handling calls from pay stations; the collection of messenger charges on appointment calls; the necessity of treating the public in a prompt and courteous manner; the necessity of a harmonious feeling between all toll operators.

Also it might be advisable to issue in simple form, instruction as to the care, testing and repairs necessary on magneto systems for distribution among the new recruits to the great army of telephone workers.

Owing to the existing conditions, it would not be feasible to adopt a standard as to the cable distribution, line routes or types of equipment in the larger exchanges in the cities, but instructions as to how the cable may be hung, how leads may be run, etc., can be fully taken care of in the manners before suggested.

For magneto exchanges, suggestions might be made along the line of adoption of a 4-bar 1,000 ohm instrument as a standard for local and lightly loaded lines, as they give the best service and are more readily interchangeable than any other. For heavily loaded rural lines, however, it would be well to make exception and use a 5-bar 1,600 ohm instrument, as actual practice has proven this best suited for that class of work. Whether they be wired with push buttons so as to ring central without signalling the other subscribers or vice versa, may be a matter of choice with each individual manager. The use of a low capacity condenser in the receiver circuit assures positive ringing on the line in case a receiver is accidentally or otherwise left off the receiver hook.

The suggestions here offered are made not with the idea of forcing a radical change in the equipment of the companies now operating, but to have them so use the equipment they now have that it may give the greatest good to the greatest number. Not to use the cheapest or the most expensive equipment, but to use the best equipment in the manner best suited for the perfection of Independent service, the satisfaction of Independent patrons and the advancement of the Independent telephone movement.

It lies not alone with the manufacturers, nor with the individual operator or exchange manager to accomplish this result, but it requires the concerted action of the association and all their members.—*A Paper read by L. E. Knapp before the New York Independent Telephone Convention at Niagara Falls.*

HOW TO PROVIDE FOR RECONSTRUCTION AND CREATE A MARKET FOR SECURITIES.

We all have heard the telephone exchange manager complain that he does not have sufficient capital at his command to properly develop the business in the territory being operated. There are very few communities in the United States that do not have unlimited available capital to develop the telephone needs of each district, if properly managed.

The history of a large percentage of the incorporated companies in this country reveals the fact that they fell victims to a common error at the very start. Usually, after the parties interested in the formation of a new telephone company received the prospectus of the proposed system, they decided that a certain amount of capital would build, equip and operate the plant, which was readily subscribed by the promoters and persons interested. After operating six months or a year, the management finds the demands for the service are exceeding their expectations, and that in order to be able to give service to those who apply it is necessary to extend the lines and increase the facilities in many ways, all of which consume capital.

In order to meet this demand, he uses whatever funds may be available, thereby keeping his treasury drained all the time.

Your annual statement shows that your first year's operation

netted a handsome profit, and console your shareholders with the fact, that in order to meet the demands for your service, you were compelled to invest the earnings for additions and extensions, and that the book value of your stock is anywhere from ten to twenty per cent above par, and for this reason you cannot pay a cash dividend. This report is satisfactory to all concerned, and at the end of the second year you find the same conditions. You again make a similar report.

You now find that your shareholders are not so much enthused over their holdings, and everybody interested begins to realize that a prosperous telephone plant has a voracious appetite for money, and you all wonder when will this ever stop. You continue in this manner from year to year, and you find your treasury constantly drained. You have not created a surplus fund to provide for reconstruction, commonly known as depreciation. Eventually you declare a dividend to the amount of the earnings which you have invested for extensions, etc., but, on account of not having paid any cash dividends, your stock has no market value, and your stockholders become dissatisfied and disinterested, your plant depreciates, and in many cases is in deplorable condition.

Now suppose you had pursued a different policy. At the end of the first year your statement, as in the first case, shows net earnings anywhere from ten to twenty per cent, and your original capital all invested. You set aside in a surplus or reconstruction fund a reasonable sum to provide for renewals of your property from time to time, and pay the balance to your shareholders in cash, quarterly, dividends. You issue additional stock to provide funds for the necessary extensions, and you find your shareholders all eager to take up their proportion of the new issue. You now find that your property is earning a handsome surplus annually out of which you add from year to year a sufficient sum to your reconstruction fund to provide for renewals of your plant, and pay the balance to your shareholders in cash dividends. You soon find your stock commands a premium and is much sought for by investors and business men, each one of whom makes your company stronger and more representative.

I am familiar with the operating and financial details of a property that began operating in 1895, which invested its earnings in extensions but created no surplus or reconstruction fund. After operating five years, the company realized that the entire property had become antiquated and it must either reconstruct the plant or go out of business. A stockholders' meeting was held, and the final verdict was in favor of rebuilding the entire property, and operating under the "pay cash dividends and create a reconstruction fund" plan. The first plant showed a net loss in five years, of about $52,000. The second plant, after operating five years, is in a much better physical condition than when constructed, has been paying handsome cash dividends, has a permanent reconstruction fund of $50,000, and the stock, par value $50, is in demand at $130.

You can readily understand why this property has not depreciated. The book value of this stock is never less than 100 per cent of the cost of the property, and the market value as much over 100 per cent as the public will pay premium for the stock.—*A Paper read by E. D. Shade before the Pennsylvania Independent Telephone Convention at Allentown.*

TRAINING OPERATORS.

The matter of securing and training telephone operators for a large exchange is perhaps a problem which does not directly concern the engineer. However, it may be of interest to make a few remarks concerning the methods employed in training telephone employes.

The making of an expert operator is by no means the simple matter that many suppose it to be. At its simplest, the operation of a switchboard so as to give a thoroughly efficient and satisfactory service demands an intelligence somewhat above the average, trained and guided by careful tuition and supervision. But in a large city telephone system there is such a variety of possible calls that may be made—local, suburban and long distance, direct line, party line, public station, private branch exchange, etc.—and this great and ever-increasing variety involves the use of so many different signal tests, each having its proper place in the general scheme for the rapid and accurate handling of traffic. The demands made on the capacity of the expert operator are far more exacting than one not familiar with the inside working of a telephone system would readily believe. With the growing complication of the modern city telephone system and its traffic there has arisen a necessity for giving the operators a regular course of preliminary training and tuition before entrusting them with any part of the actual work of operating subscribers' lines.

The method of teaching telephone operators their work formerly followed was to allow the learner to "listen in" at a working operator's position and to watch the handling of the plugs and keys and the display of signals, picking up what explanation she could of the meaning of these movements from the order and answer she overheard in her head telephone. After a period of this learning by looking on, with a certain amount of instruction from supervisors and chief operators to aid her in acquiring a working knowledge of the switchboard, the learner was placed at a lightly loaded position, under the wing of an expert operator, and so gradually acquired by sheer practice the confidence and quickness of the full-fledged operator.

After about three years' service at the switchboard she left to get married, to take up other work, because she was wanted at home, and probably for a variety of reasons; but, anyhow, she left, and her place had to be filled by the laborious process of training a learner in the manner described.

The new method of training operators is as great an advance over the old as the common battery switchboard is over the magneto system. So that in about five months' time the new system produces the result that formerly was estimated to take about nine months, and produces it with much less trouble and friction both inside the exchanges and between operators and subscribers.—*Paper read by F. W. Yensen before the Southwestern Electrical Association at Galveston, Texas.*

AT THE TELEPHONE.

I falter at the last, for well I know
The words I speak fall on no listening ear.
An unresponsive silence tells me so,
In vain do I reiterate "Hello!"
I am cut off; that much is very clear.

And so I move the lever up and down,
Slowly at first, but with increasing speed,
The while my brow has furrowed in a frown,
And lurid verb and adjective and noun
To breathe my thought seem very weak, indeed.

The booth is hot, and perspiration dews
My forehead, and for air I faintly pant.
Under such circumstances you'd excuse
Me if the language that I pine to use
Is rather forcible than elegant.

What in ——— ails that "central?" I suppose
She's gone to lunch, or very likely she's
Asleep. I'll try to wake her up. Here goes!
Ah, then I roused her! Now again come those
Sweet, mellow accents, "Drop a nickel, please."

Wouldn't that jar you? When into the slot
You've dropped your coin and heard its signal click
Five minutes since, and got three numbers, not
What you had called for—wouldn't you be hot?
Wouldn't such monkey business make you sick?

And when at last you'd got the girl all right—
The party, I should say, you needn't scoff—
And then before you had got started quite
To tell her just how sweet she looked last night,
How would you like it then to be cut off?

—*Chicago News.*

TELEPHONE IN CACTUS CENTER.

There's a telephone in Cactus—it's a new, long talk machine,
And the girl who operates it is a reg'lar fairy queen;
The comp'ny sent her in here fer to run the thing in style.
And she's got the cowboys losoed, clear from here to Forty Mile.

She wears a janglin' bracelet, and a rollin' mass of hair
And when good looks was passeled she was handed out her share;
She sets there in her glory, in her awe-inspirin' togs,
And she knows that she's the ruler in this land of prairie dogs.

The boys they come a-ridin' from the corners of the range,
And they moon around in Cactus, and they're actin' mighty strange;
They have cut out cyards and drinkin', and they make a plum mean fuss,
If a puncher who's forgitful rips a loud, resoundin' cuss.

They flock up to the office, and they spend their hard-earned dough,
A phonin' off to cities where there ain't no folks they know;
It's money fer the comp'ny, but it breaks the boys like sin,
For, unlike their gamblin' pastimes, there is nary chance to win.

So, onless the girl flits eastward, there'll be trouble here this fall,
For the roundup season's comin', and we can't get help at all;
It's Hades, ain't it, pardner, when one woman, in her pride,
Gits a county full of cowboys roped and throwed, and then hog-tied!—*Denver Republican.*

MANUFACTURERS DEPARTMENT

THE LIMA JACK BOX.

The telephone is recognized as the most efficient instrument for the dispatching of trains—steam as well as electric. But up to the present time it has been an expensive proposition to equip a line with a telephone system, because of the fact that booths had to be constructed at great expense at frequent intervals. A telephone had to be installed and kept under lock and key—each conductor having a key, which necessitated his getting off the car and consuming valuable time unlocking and locking the booth, with the chance of forgetting the last operation. The booths are not infrequently destroyed by grass fires or overturned by wind storms. They were always subject to frequent repairs, because of the action of the elements, rodents, woodpeckers, etc.

Now comes George H. Metheany, a practical telephone man from the interurban districts of Ohio, and invents and obtains broad patents on the Lima jack box, which has revolutionized steam and interurban train dispatching. This box enables the train crew to obtain instant connection with the dispatcher without the delay of lock and key and without leaving the car.

Figure 1 shows the Lima jack box ready for instant use within convenient reach of the car. Figure 2 shows the ease of "plugging in" for connection to portable telephones. Figure 3 shows the parts of the Lima jack box grouped in the order they are assembled. Notice the way the spring jack holder is completely insulated from the outside casing. The spring jacks are made especially heavy and are mounted on a block of insulating material. The connections pass through mica bushings and are soldered to the weatherproof wire on the back of the spring jack holder. As a still further precaution the jack plug is equipped with a fuse which will blow if a high voltage were to get through, thus protecting the conductor and telephone from accident. The plugs have long handles and are so constructed as to leave no metal parts exposed or uninsulated in the jack box.

There is absolutely no chance of a short circuit or ground. The lock washer shown at the bottom of Figure 3 securely holds the spring jack holder in the casing and cannot be removed without special tools. This prevents the possibility of irresponsible persons tampering with the inside of the box.

Figures 4 and 5 show a cross section of the jack box and the way the parts look when assembled. Figure 4 shows the plug engaged and ready for conversation. Note the way the metal ball is displaced. Figure 5 shows the plug being withdrawn and the manner in which the ball drops back into the opening and closes it perfectly against entrance of dust, moisture and insects. Also notice the cone-shaped mouth in connection with the outer cast iron shell of the receptacle forms a double petticoat which effectually sheds off rain, sleet and snow.

The Lima jack box has been in constant use on the lines of the Ft. Wayne, Van Wert & Lima Railway Company for over a year and a half. This railroad has one installed every half mile, so that its crews do not have to go more than a quarter of a mile at any time to obtain instance communication with the dispatcher's office. They are also installed through the lines of the Muncie & Portland Traction Company and several others.

Figure 1.

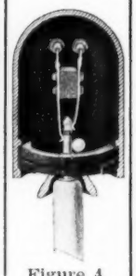


Figure 4

Figure 2.

Figure 5.

Figure 3.

The patents and rights of manufacture of the Lima jack box and plug have recently been purchased by the well-known firm of W. N. Matthews & Brother, 226 North Second street, St. Louis, who are accumulating a splendid line of money-saving patented street railway specialties. They say they are prepared to make prompt delivery of the box and plugs and solicit correspondence.

COMING ELECTRICAL SHOW.

There is every reason to believe that Chicago's second annual electrical show, which is announced for the Coliseum, January 14 to 26, will be the greatest exposition of the kind ever held in the United States, excepting of course the World's Fair exhibits. The show of last January set the pace—it was the most successful trade show ever held in Chicago in points of general interest, attendance and financial results. Managing Director Homer E. Niesz is authority for the statement that ninety-five per cent of the floor space in the main building of the Coliseum is already sold and it is more than probable that before January 1 there

will not be any available space to be had. This means that the Coliseum Annex will be used for exhibitors.

Mr. Niesz is just now giving much of his attention to the matter of reduced railway rates from points in the middle west, and for this purpose it is probable that the contemplated organization of the Allied Electrical Trades Association will be revived. It is proposed to bring the electrical men of all trades together in this association, holding meetings during the exposition, at which topics of general interest will be discussed. Members of the proposed association will not only be eligible for the reduced railway rates but will also be provided with a ticket to the exposition good throughout the dates of the convention and will also be given the privileges of the Electrical Trades Club, specially furnished rooms for which are to be provided at the Coliseum.

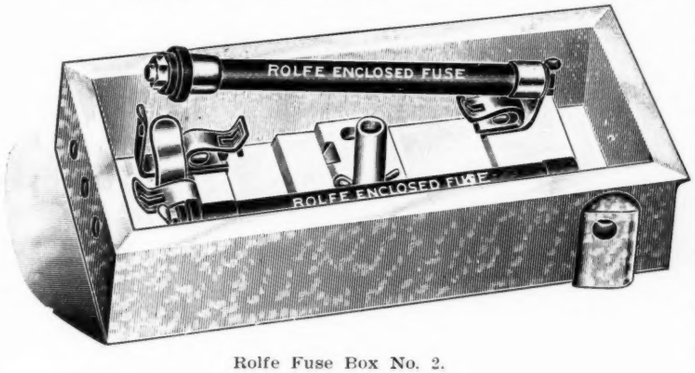
Telephone manufacturers are taking an unusually keen interest in the coming show owing to the keen rivalry between the Independent and the Bell interests. All telephone exhibitors of last year have taken double the space for the coming show, notably the Chicago Telephone Company, American Telephone & Telegraph Company, the Automatic Electric Company, Swedish-American Telephone Company, Stromberg-Carlson Company, Kellogg Switchboard & Supply Company, Frank B. Cook and other firms which manufacture directly or indirectly for the telephone interests.

Managing Director Niesz and Vice-president E. B. Overshiner went to New York recently to confer with Dr. Thaddeus Cahill, the inventor of the telharmonium, with the view of having one of these new inventions installed and demonstrated at the 1907 show.

ROLFE FUSE BOX NO. 2.

The Rolfe Electric Company of Rochester, N. Y., is the pioneer in the protector business. Its goods have been approved by the National Board of Fire Underwriters, the International Association of Chiefs of the Fire Department and the International Association of Municipal Electricians.

The company was the first to offer to the Independent



Rolfe Fuse Box No. 2.

telephone field an approved fuse box protector which not only reduces the fire hazard but insures its users from damage suits from the introduction of currents of high potential over its lines. The company's latest production, Fuse Box No. 2, is shown in the above illustration.

The box is of heavy glazed porcelain, thus requiring no insulation. The cover is of galvanized iron and is held firmly in place by a screw which threads into an upright binding post in the center of the box. The protector is of the approved type of carbon and line fuse. The carbons being mounted upon the end of the line fuse, as shown in the illustration, the larger carbon making contact with a stiff ground spring when the fuse is in place. The terminal clips are of the new Rolfe type and require no screw-drivers or instruments of any kind in making the connections. All contacts are spring contacts under pressure, thus insuring a perfect connection at all times. From start to finish this box is of the first quality throughout and the large orders received for it already demonstrate its popularity.

Upon request the Rolfe Electric Company of Rochester, N. Y., will be pleased to furnish information regarding prices, etc.

RECENT COOK SALES.

Frank B. Cook has received many orders for complete outside equipment, or pole cable terminals, for various exchanges, as well as a large number of orders for distributing frames and switchboard protectors, including his types No. 8, No. 10, and No. 14. Mr. Cook has also been kept busy turning out his type B-4, type B-5 and type B-6 protectors for the protection of telephone instruments themselves. A few of the largest orders he has received for these various types of apparatus follow; the majority of them are for the complete equipment.

La Compagnie de Telephone de Bellechasse, Levis, P. Q.; complete terminal equipment for Rimouski, P. Q., Canada; Marion & Northern Telephone Company, Clintonville, Wis.; Ohio & Mississippi Valley Telephone Company, for its exchange at Anna, Illinois, also for its exchange at Carbondale, Illinois; Farmington Telephone Company, Farmington, Missouri; Tazewell County Telephone Company, Morton, Illinois; Commercial Electrical Supply Company, St. Louis, Missouri, for the Home Enterprise Telephone Company, Woodworth, O. T.; The Pinckneyville Telephone Company, Pinckneyville, Ill.; Sullivan Telephone Company, Sullivan, Indiana; The Portsmouth Telephone Company, Portsmouth, Ohio; The York County Telephone Company, York, Nebraska; Little Rock Telephone Company, Little Rock, Arkansas; Stromberg-Carlson Telephone Manufacturing Company, for the Farmers' Mutual Telephone Company, Everett, Washington. These comprise only the largest orders for terminals.

For type L distributing frame and switchboard protectors, including the No. 8, No. 10 and No. 14 type, Mr. Cook has received orders from the following: Dean Electric Company for the Statesville Telephone Company, Statesville, N. C.; E. H. Martin Telephone Company, Webster City, Iowa; American Automatic Telephone Company, Rochester, New York, for the Home Telephone Company, Ironton, Ohio; Sullivan Telephone Company, Sullivan, Indiana; Dean Electric Company, for Farmers and Merchants Telephone Company, Odessa, Mo.; National Telephone & Telegraph Company, Wheeling, W. Va.; Citizens' Telephone Company, Grand Rapids, Michigan, an addition of 1,000 pairs of main distributing frame; Stromberg-Carlson Telephone Mfg. Co., for the Bristol Telephone Company, Bristol, Tenn. Also an addition of 4,800 pairs for the exchange of the Tri-State Telephone & Telegraph Company, Minneapolis, Minn., South Branch; North Electric Company, for Conneaut Telephone Company, Conneaut, Ohio; Chicago Electric Protective Company, 147 Fifth avenue, Chicago.

For subscribers' station protectors, either types B-4, B-5 or B-6, the following orders have been received: Wabash Valley Telephone Company, Paris, Illinois; Citizens' Independent Telephone Company, Terre Haute, Ind.; Brockport Telephone Company, Brockport, New York; United Telephone & Telegraph Company, Philadelphia, Pa.; Independent Telephone Company, Council Bluffs, Iowa; People's Telephone Company, Superior, Wis. Georgia Telephone & Telegraph Company, Savannah, Ga.

Mr. Cook has also received a great many large orders on his self-welding wire joints, universal guy clamps and Cook clip. Prices and description of any or all of these types of apparatus will be cheerfully furnished on application.

TRADE NOTES.

THE AMERICAN CLOCK COMPANY, Chicago, invites attention to its advertisement on page 83. It will send its new catalogue upon request.

THE COMMERCIAL ELECTRICAL SUPPLY COMPANY of St. Louis, in its semi-monthly stock sheet and price list, gives size, weight, list price and all necessary information on its stock of rubber and lead covered wires and cables. This price list will be mailed to anyone upon request.

THE DECENNIAL ANNIVERSARY of the founding of the Thomas S. Clarkson Memorial School of Technology was held at Potsdam, N. Y., November 27-30, 1906. The programme was a very elaborate one as carried out and the exercises were enjoyed by the largest crowd in the history of the school.

THE JAEGER MINIATURE LAMP MANUFACTURING COMPANY of New York has recently issued a complete catalogue in which a great deal of attention is given to telephone switchboard lamps. This company manufactures lamps of all descriptions and will be pleased to send this late catalogue to prospective purchasers.

THE JULIUS ANDRAE & SONS COMPANY, Milwaukee, Wis., is sending the telephone managers a twelve page folder entitled, "Why Wisconsin is a Happy State for the Telephone Man." The folder shows a number of the Andrae specialties and apparatus, together with descriptive matter and prices, and may be had for the asking.

THE DEARBORN ELECTRIC COMPANY, Chicago, has recently issued a new catalogue illustrating and describing the company's complete line of telephone and electrical supplies and novelties. The catalogue is a comprehensive volume giving much valuable data to telephone men and will be mailed free to anyone upon request.

THE CORPORATION PUBLISHING COMPANY of Boston, Mass., has just issued a treatise on Quasi-Public Corporation Accounting and Management, by John F. J. Mullhall, P. A. The book contains over two hundred pages devoted to organization, securities, water works, gas works, electric light plants, telephone systems, steam heating works, electric railways, etc.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY of Buffalo and Toronto has sent to the trade a booklet illustrating and describing the Swan driven anchor. This anchor is meeting with marked success and is claimed to be one of the most serviceable anchors on the market. The booklet is illustrated and gives specifications and prices. It may be had upon request.

THE MANHATTAN ELECTRICAL SUPPLY COMPANY of New York and Chicago is sending out a series of booklets describing its many electrical and telephone specialties. Each leaflet illustrates and describes some piece of electrical or telephone apparatus, giving all necessary data with prices. The complete series of leaflets may be had by addressing the company at either its New York or Chicago office.

THE AMERICAN ELECTRIC FUSE COMPANY of Muskegon, Michigan, with branch office at New York City, has just issued its catalogue No. 31, showing the progress of the company since its organization in 1892 down to the present time. The new "American" catalogue fairly teems with good things for the telephone exchange. It includes all of the latest American protector apparatus as well as the old well-known American specialties. The new "American" catalogue is said to be the largest protector catalogue ever issued and will be sent postpaid on receipt of inquiry from any telephone company.

THE CORWIN TELEPHONE MANUFACTURING COMPANY, 542-544 Wabash avenue, Chicago, will on December 24, increase its capital stock from $4,000 to $10,000. The company manufactures intercommunicating telephone apparatus. The company is composed of Elmer P. Corwin, Fred L. Meckel and Frank X. Cloidt. Correspondence from telephone buyers is invited.

THE AMERICAN CLOCK COMPANY, Chicago, has ready for delivery a new catalogue of its automatic electric clocks, electric synchronous time systems, electric time stamps, etc. The company will be glad to send this fully illustrated catalogue to any one interested and will gladly submit a plan whereby an exchange manager may increase the earnings of his system very materially.

THE ELM CITY ENGINEERING COMPANY, New Haven, Conn., has recently issued a catalogue covering its H. & M. moulding branch blocks. These blocks are universally used and have been approved by the Underwriters' National Electric Association and other inspection boards throughout the country. The catalogue will be sent upon request and illustrates the company's complete line, giving dimensions and prices.

THE SWEDISH-AMERICAN TELEPHONE COMPANY reports that its branch salesroom and warehouse at Kansas City is showing a daily increase in shipments throughout the west and southwest. The above named company carries a full line of standard stock at Kansas City and makes shipment same day order is received, a service that is evidently appreciated by its many customers judging from volume of business being done.

THE CENTRAL TELEPHONE & ELECTRIC COMPANY of St. Louis, Mo., is distributing bulletin 25 to the trade and those who make request. It is a most complete telephone catalogue and shows the extensive line of apparatus which the company manufactures for magneto and central energy systems. There are many new ideas in telephone apparatus embodied in this catalogue, and it will be well worth the while of all operating telephone companies to have same on file.

THE "CHAPMAN LIGHTNING ARRESTER" is the subject of an interesting booklet issued by the Minnesota Electric Company of Minneapolis. The book is fully illustrated and contains much valuable information on protection in general, and the Chapman protective device in particular, fully describing its many uses and giving instructions as to how and under what condition the arrester is used. The company will be glad to mail this booklet to anyone upon request.

THE COMMERCIAL ELECTRICAL SUPPLY COMPANY of St. Louis, Mo., is calling the attention of the trade to the fact that all material in which copper or brass is used will be subject to an advance in price and advises the placing of

orders at the present market price. The company promises courteous treatment and prompt execution of all orders. One of the specialties it is calling special attention to in a neat folder is the Stombaugh guy anchor. This anchor is fully described and a price list is shown on all sizes of anchors.

THE STERLING LUMBER & CEDAR COMPANY is the name of a new cedar producing company of considerable magnitude which has recently been organized at Charles, Mich. The new concern is said to own about 4,000 acres of fine cedar in that section and has docks on Lakes Michigan and Huron, affording it ample shipping facilities of a very convenient and economical nature. The new firm expects to produce large quantities of the best telephone poles. W. C. Sterling & Son of Monroe, Mich., are prominent factors in the new organization.

THE PREMIER ELECTRIC COMPANY of Chicago is calling attention to its Premier dry battery No. 6, which it claims is unequaled for telephone work. The company uses the best material in the manufacture of this battery, and claims for it high amperage, marvelous recuperative powers and long life. The company will send a consignment of these batteries upon approval; and requests inquiries from exchange managers. The company reports an increasing sale for its Premier receiver and switchboard cords, and will be glad to send printed matter and prices to interested parties.

THE NEW SUPPLY CATALOGUE which is now in course of preparation by the F. Bissell Co., Toledo, O., is designed to be the most convenient, accurate and complete work of the kind which ever has been compiled. It will have almost a thousand pages and will be profusely illustrated with excellent engravings. The paper will be of fine quality and the binding neat and substantial. This book in brief will be the work of experts who have given months of careful study and hard labor to produce what they believe will prove by long odds the finest and most satisfactory supply catalogue ever produced. The telephone features of this new book will be especially deserving and those of TELEPHONY'S readers who desire a complimentary copy will do well to notify Bissell & Co. just as early as is convenient.

THE BLAKE SIGNAL AND MANUFACTURING COMPANY reports that during the last month it has signed contracts for its signals with various roads in the east and middle west amounting to over $12,000. The interurban roads using a telephone system of train dispatching are beginning to realize what a valuable supplement the Blake signals make to their telephone system, and that they are practically indispensable for the proper and safe handling of traffic. These signals enable the dispatchers to stop a car at any telephone point for orders, thus saving much time and also adding to the safety of operation. The signals by so successfully supplementing the telephone system of dispatching are making the use of the telephone for dispatching more popular and thereby increasing the demand for telephones for this purpose.

THE CENTURY TELEPHONE CONSTRUCTION COMPANY of Buffalo and Toronto calls attention to the fact of an inquiry department recently established. In speaking of this department and its scope, the company states: "Realizing the fact that the exchange manager is often desirous of obtaining quickly, information relative to the clearance of telephonic troubles and the methods of accomplishing results, the manner of which he is in doubt, we wish to announce that we have established an inquiry department for the benefit of our friends and customers, which will answer fully, illustrating with diagrams where necessary, all questions of any kind relative to exchange operation and trouble clearance. This department will be in charge of one of the most competent engineers in Independent telephony and we cordially invite you to make the fullest use of it. There will be no charge."

THE CENTRAL ELECTRIC COMPANY of Chicago has just issued a little booklet of twenty-eight pages of "Holiday Suggestions." The cover design is done in three colors and is very appropriate, suggesting as it does the holiday season. The first few pages are devoted to electric reading and desk lamps and many handsome designs are shown, and the next two pages to electric heating devices, the electric chafing dish and flatiron being given prominence. Considerable space is also given to miniature street railways, showing various motor cars, trailers, track and all parts that go to make up a complete street railway. Motors, engines and a motor boat are shown, a learners' telegraph outfit is illustrated and described as well as a complete wireless telegraph outfit. Flashlights, electric clocks and many other electrical novelties are shown, and it is suggested that parties interested write the Central Electric Company for a copy of this booklet. Dealers and central stations will find it interesting and of value as suggesting a large field for doing a nice business among their patrons in this line during the next few weeks.

THE FRENCH BATTERY COMPANY, Madison, Wisconsin, has recently issued a comprehensive catalogue dealing with dry batteries of all sizes. In the preface to the catalogue the company says:

"A dry battery cannot be better than the formula under which it is prepared, except as the quality of the material which is employed may improve the results to be obtained.

"The only difference in the various types of dry cells now upon the American market is found solely in the quality of zinc, carbon, manganese, sal-ammoniac and other material of which they are composed, and these alone are responsible for the diversity of results with which you are familiar. All of the American manufacturers of dry batteries have adopted the ancient German formula and are all producing dry cells upon the same basic principles. We desire to call your attention to this fact, to give you a very apparent reason why our battery will be found different from the batteries which have been on the market before. 'Fleur de Lys' dry batteries are made under advanced French processes. A French scientist produced the first dry battery and France is still leading the world in the science of chemistry and excellence of its battery production.

"We would not belittle the importance of pure material as a large factor in producing the highest efficiency in a dry cell, but only desire to emphasize the limit which the treatment of them must be bounded by, under the present conditions in America.

"So highly do we recognize the necessity for the use of the purest grade of raw material obtainable, that all essential ingredients in 'Fleur de Lys' cells are imported from France and are especially adapted to the process employed in their manufacture.

"In asking your attention to this catalogue and price list and inviting your patronage, we have felt the necessity of presenting some reasonable assurance that what we desire to interest you in is of peculiar and real value. We trust that our statements may lead you to investigate our batteries and we shall be gratified to supply you promptly with any number of our different cells."

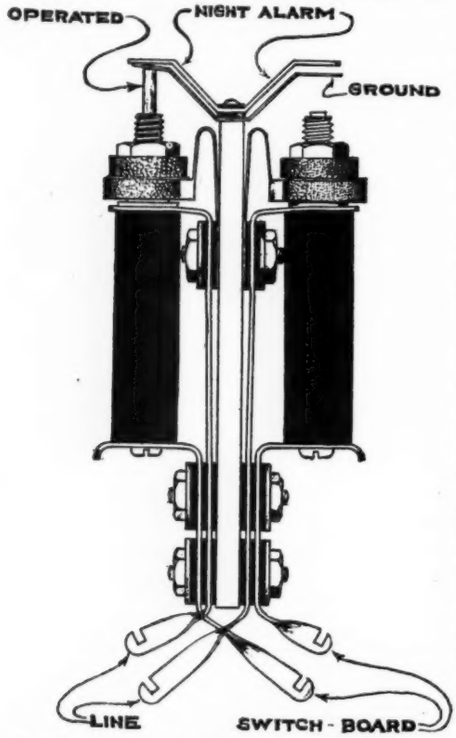
FIRE UNDERWRITERS RULES.

The American Electric Fuse Company of Muskegon, Michigan, has recently issued a booklet giving complete rules and requirements of the National Board of Fire Underwriters for the installation of electric wiring and apparatus and showing all the specifications for the installa-

tion of telephone protectors. This book is invaluable for telephone exchange managers and will fill a long felt want. The American Electric Fuse Company will furnish free copies on request.

NEW AMERICAN SWITCHBOARD PROTECTOR.

The American type "H" protector is claimed to be the simplest and most compact switchboard protector made. It measures only one and one-half inches in width, thus affording the maximum space for working between sections. All the operating parts are included in the heat cartridge, so that in case of trouble with any line, the removal of the cartridge and insertion of a new cartridge will clear the line immediately. The removed heat cartridge can then be examined and repaired at leisure.



Sectional View, American Type H Protector.

The American Electric Fuse Co. states that there is nothing about the mountings on the American type "H" protector that can get out of order or cause the slightest trouble in service. There are only two springs on each side of a protector pair, one spring holding the front and the other the rear terminal of the heat cartridge. These springs are fastened solidly on the protector base by three short brass bolts with heavy lock nuts and washers. The insulations are of the best quality hard rubber.

The American type "H" protector is claimed to have less than one-half the number of parts of any other protector made, and is built on straight, short lines, insuring the greatest possible strength and absolute freedom from any possibility of injury to the protector during ordinary service.

The contacts between the heat cartridge and its retaining springs are electrically perfect. All the mountings are of the best quality of German silver. The front terminal of the coil is grooved and fits tightly into a split spring with two stiff ears. The rear terminal of the cartridge is held by a stiff, short spring with a hole for the end of the cartridge to slip into place. When the cartridge is inserted it "snaps in," and is firmly gripped by its two retaining springs. These two springs being short, stiff and heavy make practically perfect contacts. The cross connections on the protector are made by twisting the ends of the retaining springs holding the cartridges. These terminal pieces are crossed at the back of the cartridges. They are short and very stiff, thus insuring absolute freedom from deplacement or crosses. No guarding pieces are needed. The terminal ends are notched and tinned for soldering.

Coil with Shell On.

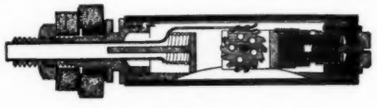
The grounding device and local, or alarm strip are at the extreme front end of the protector.

This feature is absolutely new in the American type "H" protector and to embody a decided improvement over all other protectors made. The local and ground strips are made in sections of five pair each, each section being separately removable. The ground strip is made of phosphor bronze and the local strip is of heavy hard brass.

Side View with Shell Removed.

When the protector is operated, a spring inside the cartridge opens the circuit and forces out the plunger against the phosphor bronze ground spring, which in its turn is immediately driven hard against the local strip. Thus the protector is first opened, then grounded, and afterwards the local circuit is closed, giving the alarm of a line in trouble. The locals are perfectly insulated from all lines on the protector, so that when one protector has been operated, it does not affect any other line.

The heat cartridge also comprises the carbon lightning arrester, the inner, or ground carbon being in contact with a phosphor bronze curved spring projecting upward from the protector base. The two carbons are separated and insulated from each other by a dustproof mica dielectric, and are held in place by a clamping nut on the front end of the cartridge. The lightning arrester therefore is removable with the heat cartridge.


Section with Shell On.

The heat coil is enclosed within an outer shell of polished hard rubber, and an inner one piece shell of brass. This makes the cartridge very stiff and strong, and protects the coil from any possibility of injury, since no operating parts are exposed. Rough treatment does not injure the cartridge. The heat coil itself consists of one layer of specially insulated resistance wire (standard resistance winding 8 ohms) wound on a thin brass shell. At the front end of this shell the operating part of the coil is located, being a small toothed wheel held in place by solder made to operate at a low temperature limit.

When the cartridge is set for use, the toothed wheel is engaged by a phosphor bronze plunger, the opposite end of which projects from the front of the cartridge. When the solder is softened by the generation of heat in the coil, the toothed wheel revolves slightly and the phosphor bronze plunger is immediately released. A strong piano wire coil spring forces the phosphor bronze plunger outward as soon as it is released by the moving of the wheel, and the line is first opened, then grounded, and finally the local circuit is closed giving the alarm of a line in trouble. The three operations are practically simultaneous.

Top View with Shell Removed.

When the coil has been operated it is easily reset by simply pushing the plunger back into the body of the cartridge where it again hooks on the toothed wheel. The solder

meanwhile having cooled, resolders the toothed wheel in place, and the protector is again ready for use. There is only one contact point in the entire cartridge, viz.: between the phosphor bronze plunger and the toothed brass wheel. This contact is electrically perfect, being of two sharp edges against each other under the pressure of the stiff piano wire spring.

The American Electric Fuse Company claims that no protector is so simple, efficient and free from the possibilities of trouble as the new American type "H," and it is offered to the trade by the American Electric Fuse Company in the belief that it will be adopted as the standard protector for all switchboard work.

It is a self-soldering, or self-repairing protector, therefore is most economical for use, no renewals being necessary of operated coils. It is simple in construction and free from trouble and is so compact as to offer the maximum of working space on the protector frame.

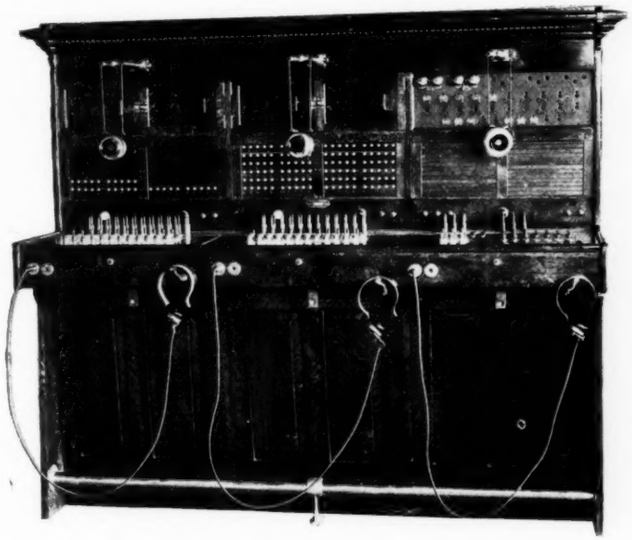
NEW CENTRAL ENERGY PLANT AT MANDAN.

The Western Telephone Manufacturing Company of Chicago has just completed the shipment of a complete exchange equipment and telephones for the Citizens' Independent Telephone Company at Mandan, North Dakota.

The new Mandan plant, it is claimed, will be the most modern and perfectly equipped Independent exchange in the Northwest, and this prospect is already the occasion of much favorable comment among neighboring exchanges, and both the owner, C. E. V. Draper, and the Western Telephone Manufacturing Company, are receiving the highest compliments on this model exchange installation.

The switchboard is of the standard Western central energy lamp signal type, equipped with one toll position and designed with a plug ending transfer system. It has a capacity of 300 central energy lines and 25 toll lines.

Each cord circuit is equipped with 4-party selective ring-

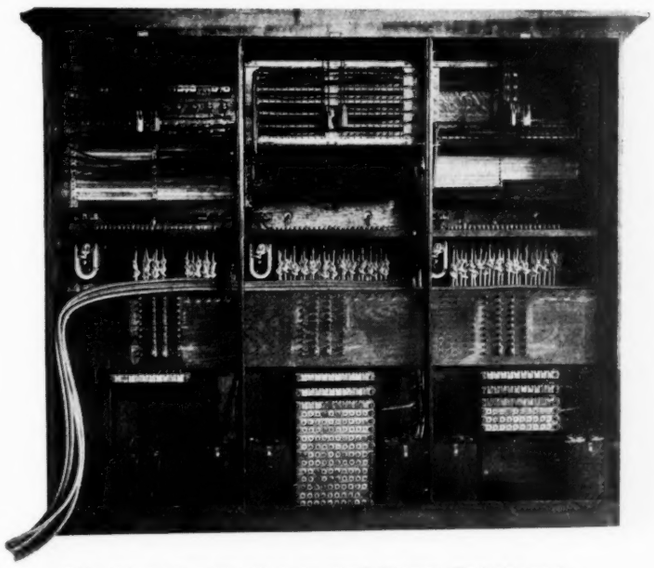


New Western Central Energy Switchboard.

ing keys and double lamp supervisory. The line relays are contained in the upper part of the switchboard and are accessible from both front and rear of the board. The relays are mounted on a spinal frame built into the board. All the circuits are fused on a terminal board in the rear of the switchboard. Thus the most compact type of design is furnished without the sacrifice of any desirable features.

The operator's circuit is so arranged that either a breast transmitter or the ordinary transmitter suspended from an arm can be used.

Each position of the board is equipped with a line and ringing pilot lamp and also with the necessary night bell, generator and position switches.



Rear View New Western Central Energy Switchboard.

The cabinet is a golden oak with piano finish and the entire board presents a very handsome appearance.

AMERICAN ELECTRIC TELEPHONE COMPANY'S FACTORY.

The experience of the American Electric Telephone Company in the manufacture of telephones and switchboard appliances has been one of constant expansion. While this company has been located in Chicago since the earliest days of Independent telephony, its greatest call for manufacturing facilities occurred in the early part of 1900, when the company was obliged to locate in a large eight-story building at Jackson boulevard and Canal street. In addition to occupying this building, three different divisions of the factories were located as follows: A two-story structure on Jackson boulevard; one large division on Canal street; another division at the corner of Van Buren and Canal streets. Four years later, in 1904, it was found that even these facilities were not sufficient for keeping up with the increasing business, with the result that a twelve-acre lot was purchased at State and Sixty-fourth streets and building operations immediately commenced. In May, 1905, the factory was completed. This building, which is of the saw-tooth construction, contains approximately 200,000 square feet of working space and consists of two stories and basement, and contains all of the different executive and manufacturing departments of the company.

The machinery used is all driven by electric motors, supplied with current from electric generators. This plan of electrical driving being the most up-to-date way of supplying power to machinery. The power plant consists of a 175 horsepower engine driving a 150,000 Watt dynamo, and sufficient space is allowed in the engine room for an additional engine and dynamo. The boiler plant consists of a 350 horsepower equipment of duplicate boilers. The entire factory is provided with every modern manufacturing appliance. The shipping facilities are most excellent. The freight houses for the different railroads are within several blocks of the factory. The tracks of the Lake Shore & Michigan Southern, Pennsylvania, Pere Marquette, Nickel Plate run parallel to the factory, while the Chicago, Rock Island & Pacific and Chicago & Eastern Illinois freight depots are within two blocks of the factory. This close proximity of the different railroads permits of hand-

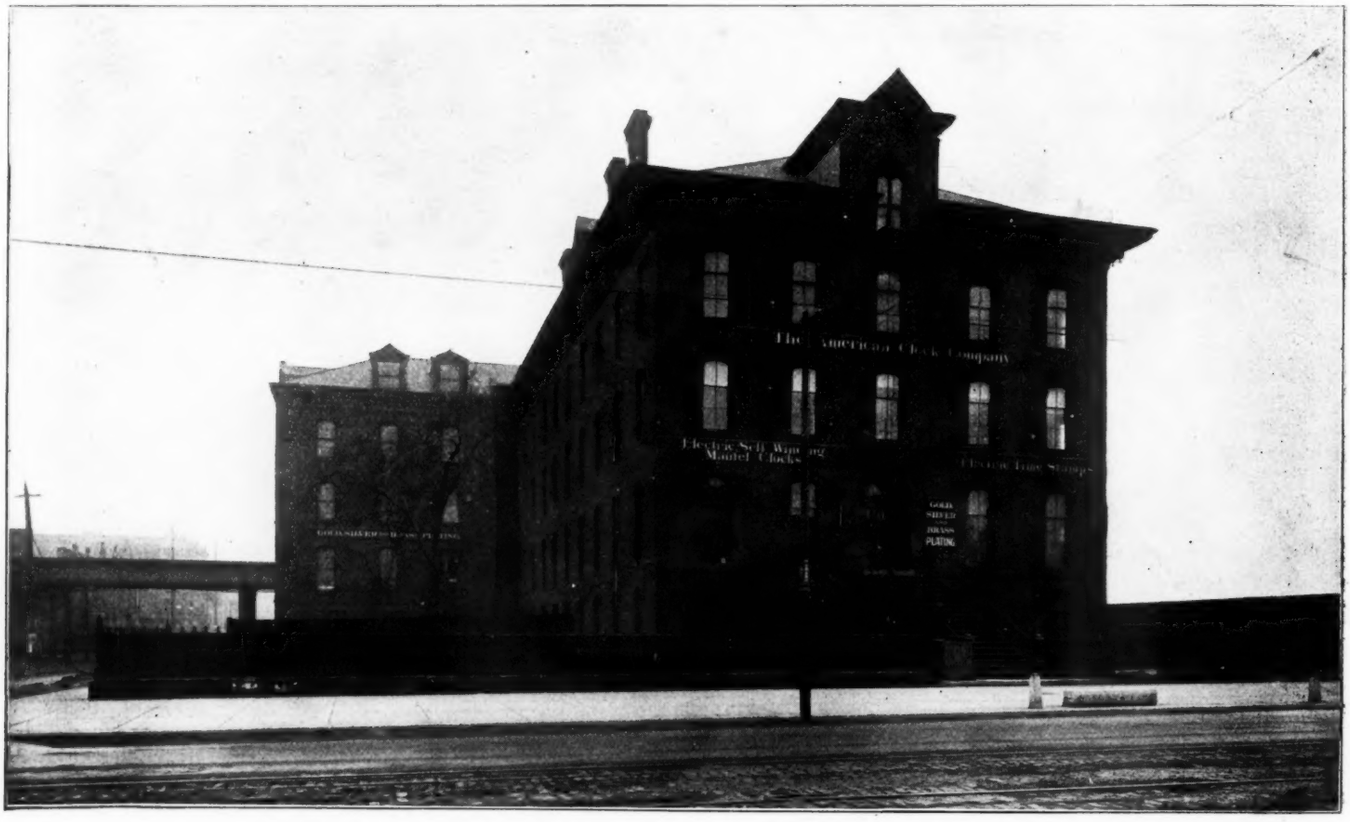
ling shipments in a particularly efficient manner, relieving the company from the annoyance of the down-town freight depot congestion. The heart of the business district of Chicago is within fifteen minutes' ride from the new American factory.

AMERICAN CLOCK COMPANY.

In this issue of TELEPHONY is shown a view of the factory and general offices of the American Clock Company, situated at Wabash avenue and Twentieth street, Chicago, as well as portraits of the offices of the company. This concern manufactures automatic electric clocks, electro synchronous timepieces, electric time stamps and other specialties, most of which are used in the telephone field. The company in its advertisement on page 83 of this issue calls attention to its electric clocks, which exchange managers would do well to investigate.

The American Clock Company has been doing business for the last fifteen years and during that time has secured many important patents governing the electrical clock, which an efficient corps of electrical specialists have perfected until to-day the company claims it has not a successful competitor in the world in its line.

Early in November H. O. Jackson of Norfolk, Virginia, bought the entire capital stock of the company, selling, in turn, blocks of the stock to his associates whom he had chosen and agreed with as to the future development of the company, before the deal was consummated. Every share of the stock of the company is now owned by its officers.



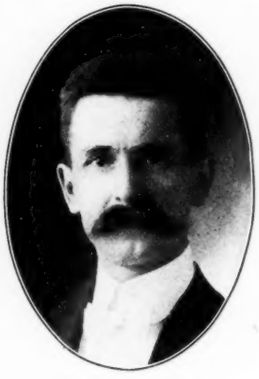
Factory of the American Clock Company, Twentieth and Wabash Avenue, Chicago.

The company's synchronous time system, wherein they synchronize electric clocks over telephone wires, thus enabling telephone companies to rent clocks and furnish accurate and uniform time, in connection with their telephone system, is fully covered by patents. The company's secondary clock system is governed by a master clock. A well equipped electro-plating department is one of the new features added to the plant. The company also owns all the

H. O. Jackson.

Ed. S. Eves.

G. F. Randall.



H. W. Pidgeon.

E. E. Flora.

patents governing its electrical time stamp which it claims is the only electric time stamp in the world.

H. O. Jackson, president of the company, is a practical and successful insurance man, who has been very successful in commercializing his own inventions, among which is the new electric time stamp, and the automatic accident insurance vending machine. Mr. Jackson is also president of the Southern Savings Life and Accident Insurance Company of Norfolk, Virginia.

Ed S. Eves, the new vice-president and general manager, is a Nebraskan, an energetic western newspaper man and a successful promoter. His business training and wide experience makes him an exceptionally strong executive officer.

G. F. Randall, secretary and treasurer, is a man well known among the manufacturing interests of Chicago and has been with the American Clock Company for a number of years.

H. W. Pidgeon, superintendent, is an expert machinist and inventor of the synchronous time system. He has been with the company in his present capacity for a number of years.

E. E. Flora, on the company's staff as mechanical expert, is an electrical specialist and inventor too well known to need introduction.

The organization as a whole is strong and promises an aggressive campaign for the further exploitation of the company's product. Exchange managers are requested to write the company for its latest catalogue and a plan which it has perfected for increasing the earning capacity of telephone systems. All correspondence will be given prompt attention.

HANDBOOK OF TELEPHONE INFORMATION.

Handbook No. 17, recently issued by the Standard Underground Cable Company, Pittsburg, is a veritable encyclopedia of information for telephone men and especially useful to all those who have to do with work upon wires and cables. Although this is the seventeenth edition of the handbook all the material is new in statement and arrangement. Included in the final chapters are working directions for placing. splicing and connecting electric cables, which take up the various points involved in such work in detail, giving instructions and illustrations which are frequently taken from photographs of work as actually performed.

The methods of locating faults under various conditions in practical cable work are shown, and the diagram and calculations are given in a form which makes them easy to use.

The chapter giving general electrical information includes many useful tables, statements of facts and methods of calculation which are likely to be referred to frequently.

The company states that one copy of this book is being sent gratuitously to each of its customers and to all executive officers of the larger corporations using such material as it manufactures. In order, however, that any one interested in the subject may be able to secure a copy it has decided to put it on sale at a very nominal price.

THE BLACK HAWK DRY BATTERY.

The Central Electric Manufacturing Company of Rock Island, Ill., has opened a sales office in the Monadnock block, Chicago, for the sale of its celebrated Black Hawk dry batteries.

Several new and important features are noted in the Black Hawk batteries, among them being the following:

A corrugated instead of a smooth zinc tube, which the company claims increases the zinc surface by one-third over that of other batteries.

An amalgamating generating matter to protect the zinc.

A device for the escape of gases which form in the chemicals and are injurious to the zinc, if allowed to accumulate and remain in a battery.

A tubular attachment which allows the batteries to lie dormant when not in use and which makes them operative only when needed. This is due to the active working elements of the batteries being originally in dry, powdered form. Water poured into this through the tube, at once places the battery in working order. By this means, batteries which stand on shelves, in stores and elsewhere, do not run down, their energies not being called into requisition until the user is ready for them.

The Central Electric Manufacturing Company will be pleased to answer all inquiries regarding its new batteries and is prepared to make attractive quotations on same.

OFFICIAL BULLETIN NUMBER FOUR.

In its latest bulletin the International association announces that the official report of the June convention is now ready for delivery, containing a verbatim report of the convention proceedings and the banquet, as well as a list of attendants. The cost of the report is twenty-five cents. The bulletin calls attention to the Chicago situation and the Independent victories in Milwaukee, Denver and Omaha and closes with a request for data from operating companies, so that the association may complete its work in making maps of the different states.

DR. DEMERS IN MANITOBA.

During the past month, TELEPHONY has had the pleasure of a visit from Dr. J. F. Demers, president of the Bellechasse Telephone Company, with headquarters at Levis, Province of Quebec. Dr. Demers was en route to Winnipeg, Manitoba. He has been engaged by the telephone department of the provincial government of Manitoba, to deliver twenty-four speeches during the twelve days preceding an election, which gives the citizens an opportunity to voice their sentiments with reference to the dominion act concerning telephones which was passed at the last session of parliament in Ottawa.

In the March TELEPHONY, we gave a short story of Dr. Demers and the work in which he was engaged; and it is our opinion that the provincial government of Manitoba made no mistake in promoting telephone interests when it called for the services of this gentleman. Most of Dr. Demers speeches will be to French colonists. His itinerary for the week ending November 24 was as follows:

November 19, 8 p. m., St. Malo; November 20, 2 p. m., St. Pierre, 7:30 p. m., Otterburn; November 21, 3 p. m., St. Agathe, 8 p. m., Letellier; November 22, p. m., St. Jean Baptiste, 7:30 p. m., Morris; November 23, 3 p. m., La Salle, 7:30 p. m., St. Norbert; November 24, 3 p. m., St. Charles, 8 p. m., St. Boniface.

It will be observed by the foregoing that the campaign is on in earnest in Manitoba. It was this province which sent a legislative committee into the United States last winter to investigate telephone systems, both Independent and Bell. After a most thorough investigation. the committee recommended that the province should build its own toll lines and encourage the various municipalities to build the exchanges.

At a meeting held in Portage la Prairie, commencing November 7, the Union of Manitoba Municipalities, composed of officials of the various municipalities of the province, spent two days in listening to testimony from telephone experts and officials, and then devoted half a day to general discussion. At the close of the session, a vote was taken on the question whether the Union should recommend to the several municipalities that they put in their own telephone systems. A resolution was passed by a vote of 86 to 19 favorable to the scheme, and great enthusiasm was shown when the result was made known.

It would seem from this that the Independents would en-

counter little difficulty in promoting the telephone question in this province, but, as usual, public sentiment will be required to make possible speedy development. It is clearly apparent that an election confined to the cities would result favorably for the Independents; but when the question involves the votes of all the people there is a large element of doubt to be encountered. The rural population is made up largely of thrifty foreigners whose chief occupation is the raising of wheat and stock. Rural telephone development is a thing unknown, and it will be the mission of Dr. Demers to tell these rural people the many advantages to be derived from the use of telephones. The Doctor has made a great success of the Independent telephone business in his province and will no doubt prove a powerful factor in dealing with the settlers in this work of the provincial government.

ELECTRICAL TRADES MEETING.

The eleventh annual meeting of the Electrical Trades Association of Chicago was convened at the Grand Pacific Hotel, Friday evening, November 16. More than eighty manufacturers and jobbers from the central, southern and western states were in attendance. A dinner preceded the business meeting, which was called to order by the president, Frank S. Beardslee. The reports of the officers of the association showed a remarkable increase in membership and an ever widening field of efficient service. The board of directors was increased, by an amendment of the by-laws, from five to seven members, and the election resulted as follows:

President, Seymour Guthrie, of the Kellogg Switchboard & Supply Company; vice president, William A. Browne, M. B. Austin & Company; members of the executive board: Thomas I. Stacey, Electric Appliance Company; Harry R. Parsons, Western Electric Company; Frank S. Beardslee, Beardslee Chandelier Manufacturing Company; S. E. Kennedy, Central Electric Company; Frank M. Pierce, Manhattan Electrical Supply Company. James Wolff, New York Insulated Wire Company, was re-elected Chicago member of the board of managers of the National Electrical Trades Association. Frederic P. Vose was reappointed secretary and treasurer.

After the conclusion of the business session Thomas G. Grier of the American Circular Loom Company acted as toastmaster and a delightful program followed.

Mr. Grier very generously had supplied each guest with a booklet containing the words of the sweet old melodies that have been popular for two or three generations, and led by Messrs. Parsons and Pierce, the company sang the songs with much gusto and pleasure. Instrumental music was supplied throughout the evening by Tomaso's Orchestra. More than twenty of the gentlemen present responded to the invitation of the toastmaster to testify their regard for the association and one and all voiced the sentiment that the association service had become an indispensable adjunct to their business and that the underlying principles of cooperation in the exchange of credit information had resulted in safeguarding their credits, protecting their business from financial loss, and engendering a spirit of unity and brotherhood among the jobbers and manufacturers of the trade, to an extent undreamed of ten years ago.

AN IMPORTANT DECISION.

The Supreme Court of Illinois has recently handed down a decision which will very widely effect the business interests in Illinois as well as involve many eastern manufacturers maintaining branch houses within the state.

This matter brought to our attention by Attorney Frederic P. Vose of Chicago is the case of the United Lead Company vs. Elevator Manufacturing Co., 222 Ill. 199, and relates to the restrictions placed upon foreign corporations under the laws of 1899.

The court now holds that all attempts of a foreign corporation which has not first complied with this law to transact business of whatsoever kind and nature in Illinois are absolutely without effect, and any contracts entered into within the state, without having first complied with the law, is in violation of the plain provisions of the statute, and therefore null and void and no action can be maintained thereon at any time, even if the corporation should at some time after making of the contract qualify itself to transact business in Illinois by compliance with the laws in reference to foreign corporations that desire to engage in business within the state.

The effect of this decision is very far reaching. Heretofore the trial judges generally have interpreted the Foreign Corporation Act of Illinois in the light of the decisions that have been handed down by the Supreme Court of Missouri, from which latter state Illinois borrowed the phraseology embodied in its Foreign Corporation Act.

The decisions of the Missouri courts were to the effect that a foreign corporation could institute a suit to recover the purchase price of goods sold, although the corporation had not complied with the Foreign Corporation Act, provided it did comply before the termination of the action. This gave the foreign corporation the implied right to do business, which could not be abridged, if at any time the corporation complied with the act.

This Illinois decision, however, completely wipes the slate of all business, contracts and engagements entered into by a foreign corporation maintaining a local branch within the state, and prohibiting absolutely the right of the corporation to trade at all. In this case it was contended that a foreign corporation's right to bring an action in the courts of this state was not barred by these statutes, which merely had the effect of abating the action, leaving to the foreign corporation the right to maintain its action if it should, after institution of the suit, qualify to transact business in the state, by compliance with the act.

This contention, which heretofore has been held to be the correct interpretation of the law, is now flat-footedly denied.

The effect of this decision is that all corporations organized outside of Illinois, but maintaining branches in the state must forthwith comply with the act, if they have not already done so; otherwise they are bound hand and foot by this decision.

THE BUSY MAN AND THE TELEPHONE.

For a long time after the general use of the telephone was a part of our daily business life it was possible to get the ear of the busiest of men by calling him up over the telephone, says the Electrical Times. There seemed to be something about a telephone call which it was hard to resist. It was considered rather impertinent for a third party to ask for an explanation of the caller's business, although it would have been considered perfectly in order if the inquiry was made in person.

In many cases this is no longer the case, and it is far from uncommon to have a telephone inquiry for a man of affairs answered with the information that the party called for is engaged and cannot be interrupted. "If you will give me your name," is the usual answer, "I will ask him to call you."

This is no more than just, and the thoughtful man who calls a busy man on a matter of importance should remember to give not only his name but a hint of his business as well if he chances to be unknown by name to the party called. To do this will save time and annoyance to both parties.

PROGRESS OF THE MONTH

Compiled by H. A. Downey

NEW COMPANIES

COLUMBUS, N. D.—Columbus is to have a new telephone exchange.

LITTLE RIVER, Kans.—The Mutual Telephone Company has been incorporated.

PAOLA, Kan.—The Paola Telephone Exchange of this city has been incorporated.

EUREKA, Kans.—The Star Mutual Telephone Company has filed articles of incorporation.

CLYDE, Wis.—A new farmers' telephone company is being organized and work will begin immediately.

DEL NORTE. Colo.—Plans are being made for the organization of the Farmers' Union Telephone Company.

PATTON, Pa.—The Northern Cambria Telephone Company has been incorporated with a capital stock of $5,000.

REYNOLDSVILLE, Pa.—The Paradise Telephone Company has been incorporated with a capital stock of $5,000.

CELIA, Neb.—The Celia Independent Telephone Company has been incorporated with a capital stock of $3,000.

OLYMPIA, Wash.—B. F. Hall and others have formed a company to construct and maintain a rural telephone line.

GRAND, Okla.—A charter has been filed for the Day County Telephone Company with a capital stock of $5,000.

ALICE, Tex.—The Alice and Rio Grande Telephone Company has been incorporated with a capital stock of $10,000.

DEER CREEK, Minn.—The Deer Creek Telephone Company has filed articles of incorporation with a capital stock of $25,000.

PROTECTION, Kans.—An Independent telephone company has been organized at this place and will install a local telephone system.

WESTMORELAND, Tenn.—The citizens of this place have organized a local telephone company and will at once install a system.

CHARD, Wash.—The Chard Telephone Company has been organized to extend the farmers' line from the Owsley ranch to Chard.

GALVA, Ia.—The Ida County Mutual Telephone Company of Ida County has been incorporated, with a capital stock of $5,000.

EUCLID, Minn.—The Euclid Rural Telephone Company has been organized, and has already constructed twenty-five miles of its system.

ORD, Neb.—Articles of incorporation have been filed for the Farmers' Mutual Telephone Company, with a capital stock of $25,000.

JEFFERSON, Ind.—A permit has been filed in the recorder's office authorizing the Laurel Telephone Company to do business in Clark county.

UPPER JAY, N. Y.—The citizens of this place are considering the organization of a new telephone company to construct a line from Upper Jay to Plattsburg.

JAMESTOWN, Tenn.—The Jamestown Telephone Company has been incorporated by the following: W. S. Knight, A. D. Wooldridge and W. O. Grider.

HANSONVILLE, Va.—The Homer & Lebanon Telephone Company has been incorporated, with an authorized capital stock of $2,000. W. C. Easterly is president of the company.

REVELSTOKE, B. C.—Messrs. Harvey, McCarter & Pinkham, have applied for the incorporation of a railroad company with the privilege of building telephone lines along the route.

KEMMERER, Wyo.—The Kemmerer-Big Piney Telephone Company has been incorporated with a capital stock of $5,000, to construct a telephone line from Kemmerer to Big Piney.

SULLIVAN, Wis.—The Sullivan Telephone Company has been incorporated with a capital stock of $10,000. The incorporators are W. E. Blumenstein, Paul E. McKee and John A. Freidel.

BOULDER, Colo.—The Rocky Mountain Telephone Company has been incorporated with a capital stock of $10,000. The directors are T. S. Waltermeyer, R. S. Morrison and E. D. DeSoto.

ALGONA, Ia.—Articles of incorporation have been filed with the secretary of state by the Algona Telephone Company, with a capital stock of $50,000. The incorporators are W. K. Ferguson and others.

ORD, Neb.—The various farmers' mutual telephone lines in Valley county have incorporated a county company under the name of the Farmers' Mutual Telephone Company, with headquarters at Ord.

UNADILLA, Nebr.—The Farmers' Mutual Telephone Company has been incorporated with a capital stock of $5,000. The incorporators are G. C. Gilbert, J. M. Morgan, Thomas Rodaway, John Riege, and L. H. Judkins.

THEBES, Ill.—The Thebes and Cairo Telephone Company has been incorporated with a capital stock of $5,000. The incorporators of the company are as follows: W. W. Wilbourn, C. P. Spann, Albert Brawn.

DUNSEITH, N. D.—The Dunseith Hardware and Telephone Company has been incorporated with a capital stock of $25,000. The nicroporators are John Douglas, Dunseith; C. R. Gailfus, C. I. F Wagner, Rolla.

HIGHLAND, Ill.—The Farmers' and Merchants' Telephone Company has been incorporated with a capital stock of $15,000. The incorporators of the company are Leo. R. Brandeweide, M. Cummings, John S. Koerner.

SHREWDER, Okla.—The Shrewder and Metcalf Independent Telephone Company of Shrewder has been incorporated with a capital stock of $5,000. The directors of the company are H. M. Newberry and F. O. Culpepper.

FULTON, Ia.—The Fulton Mutual Telephone Company has been organized with the following officers: President, Dr. G. H. Thompson; vice-president, Samuel McCullough; secretary, J. C. Snyder; treasurer, A. C. Williamson.

WATERFORD, Ont.—The Norfolk County Telephone Company has been organized with a capital stock of $40,000, the main office being at Waterford. The shares are $30 each and the rental of the telephones is to be $12 per year.

PAISLEY, Oreg.—The Moss Telephone Company has filed articles of incorporation with an authorized capital stock of $3,000. The incorporators of the company are as follows: Harry Bailey, Dick J. Wilcox, B. Reynolds.

CRANDALL, Ind.—The Mutual Telephone Company has been incorporated with a capital stock of $5,000 to operate a telephone system. The incorporators of the company are as follows: J. L. Walk, James Crawford, William Rudel.

LURAY, Va.—The Farmers' Mutual Telephone Company of Page county has been incorporated, with a capital stock of $5,000. The incorporators of the company are as follows: D. S. Hite, Isaiah Printz, and A. M. Beach, all of Luray.

RINGWOOD, Okla.—The Ringwood Telegraph and Telephone Company has been incorporated with a capital stock of $500. The directors of the company are E. A. Wales, E. Frasier, P. H. File, F. W. Walson, and W. W. Shadden, all of Ringwood.

CLEVELAND, O.—The Telephone Specialty Company has been incorporated with a capital stock of $10,000. The incorporators of the company are as follows: A. McGouther, A. G. McClintock. John Campbell, A. C. Baird, Edmund A. Witts.

KINGFISHER, Okla.—The Mt. Zion Rural Telephone Company has been incorporated with a capital stock of $2,000. The incorporators and directors of the company are D. L. Gilbreath, F. H. Smith and T. C. Abercrombie, all of Kingfisher.

CLEVELAND, Tex.—The Cleveland Telephone Company of Cleveland, Liberty county, has been incorporated with a capital stock of $1,000. The incorporators of the company are as follows: J. T. Tanner, R. W. Jeffries, T. A. Boothe and others.

FREDERICKSBURG, Tex.—Judge Clarence Martin and A. Gold of Fredericksburg and Alfred Vander Stucken, of Llano are interested in the formation of an Independent telephone company to construct a telephone line from Fredericksburg to San Antonio.

CINCINNATI, O.—The Telephone Mechanical Directory Company has been incorporated with a capital stock of $75,000. The incorporators of the company are as follows: G. S. Browne, Morris O. Jones, F. H. Schwab, Clarence E. Melhope, Jos. B. Hoher.

TROY, N. Y.—The New York and Vermont Home Telephone Company has been incorporated with a capital stock of $100,000. The incorporators of the company are as follows: W. Lewis Burk. William C. Colburn, James H. Coldwell, of Troy, and others.

REDDING, Calif.—Farmers in the neighborhood of Pacheco, thirteen miles from Redding, have organized a rural telephone company and will build a telephone line which will connect with the Redding exchange. The funds have already been paid in. The company is known as the Pacheco Telephone Company and the officers are as

follows: President, D. W. Hampton; secretary, W. J. B. Martin; treasurer, W. H. Hill.

Ashton, Ill.—A new telephone company has been formed among the business men and citizens of Ashton. A thirty-five year franchise has been granted by the village board. William Weiner and George H. Kersten are among the promoters of the enterprise.

Stoughton, Wis.—The Kegonsa Independent Telephone Company has been incorporated with a capital stock of $1,000. The incorporators of the company are as follows: Clarence Jordalen, O. P. Swerig, O. O. Hougan, L. P. Erdahl and O. K. Teisberg.

Duncannon, Pa.—The Eastern Perry Telephone & Telegraph Company has been incorporated with a capital stock of $5,000. It is the purpose of the company to construct a telephone line from Duncannon to Montgomery's Ferry and also to West Fairview.

Mohall, N. D.—The Cut Bank Farmers' Mutual Telephone Company has been incorporated with a capital stock of $25,000. The incorporators are P. L. Peterson, John Johnson, J. L. Dalseith, L. H. Haugan, P. Halvorson, H. Halvorson, M. H. Haugan, Mohall.

Pierre, S. D.—Articles of incorporation have been filed for the Pierpont Telephone Company at Pierpont, Day County, with a capital stock of $10,000. The incorporators of the company are as follows: E. X. Night, J. L. Bullock, M. D. Johnson, all of Pierpont.

Freedom, Ind.—The Farmers' Mutual Telephone Company of Freedom has been incorporated with a capital stock of $200 to operate in Freedom and in Owen county. The incorporators of the company are as follows: Jonathan Branham, John W. Pryor, Frank C. Dunn.

Noblesville, Ind.—The Noblesville and Ohio Telephone Company has been incorporated with a capital stock of $816 to establish, maintain and operate a telephone system in Hamilton county. The incorporators of the company are E. F. Klepfer, L. G. Heiny and J. F. Kraus.

Emporia, Va.—The Meherrin Valley Telephone Company has been incorporated, with a capital stock of $5,000 maximum; $1,000 minimum. The incorporators of the company are as follows: H. L. Taylor, president; M. J. Squire, J. T. Bryant, F. T. Fox, W. W. White, all of Emporia.

Effingham, Ill.—The Central Illinois Long Distance Telephone and Telegraph Company has been incorporated with a capital stock of $2,500. The purpose of the company is to operate telephone and telegraph lines. The incorporators of the company are B. W. Kerr, C. E. Munday, T. C. Dore.

Macon, Ga.—The Parker Constructing Company has been incorporated with a capital stock of $50,000 for the purpose of building telephone and telegraph lines in the city of Macon. The incorporators of the company are T. C. Parker, T. M. Wheless, J. W. Markham and T. B. West.

Burlington, Ia.—Articles of incorporation have been filed for the Gate Telephone Company, which is thought to be a branch of the Mississippi Valley Telephone Company of Keokuk, as Thos. Pebbles, who is connected with this company, is secretary and treasurer of the organization.

Olustee, Okla.—The Olustee Telephone Company has been incorporated with a capital stock of $5,000. The directors of the company are as follows: J. W. Weems, Carmel; E. G. Walcot, T. J. Truscott, J. W. Edwards, D. W. Walden, Wm. F. Armstrong and T. R. Moore, of Olustee.

Norfolk, Va.—The Atlantic Electric Company has been chartered with a capital stock of $50,000. The company proposes to conduct an electrical construction and supply business in Norfolk. The officers of the company are as follows: President, Walter Hitt; secretary and treasurer, H. N. Brown.

Absarokee, Mont.—At a meeting recently held in this place steps were taken to organize the Absarokee Telephone Company. Ed Becker was chosen president and Joseph Kern secretary and treasurer. It is expected that the Stillwater Telephone Company will extend its line to connect with this line.

Dover, Del.—Articles of incorporation have been filed for the Electric Supply Company, to transact a business of wholesale and retail electric supplies. The capital stock is $5,000 and the incorporators are as follows: George M. Upshur, Franklin Upshur, Sherwood R. Murphy and John M. Newverth, Jr.

Sullivan, Ill.—A new Independent telephone company to be known as the Diamond Mutual Telephone Company has been organized at this place and the following officers elected: President, William Sherburn; secretary, J. F. Fleming, directors, Irving Shuman, J. R. Bean, James LeGrand, William Sherburn, L. C. Horn and J. F. Fleming.

Winnfield, La.—The charter for the Winnfield Parish Telephone Company has been filed in the recorder's office. The capital stock of the company is $5,000, and by the terms of the charter the company is to build and operate telephone and telegraph lines in any parish in Louisiana. The home office of the company is Royal. The directors of the company are C. W. Smith, W. W. McCarty, J. J. Thornton, J. W. Higdon and S. R. Newson. The company already has several miles of rural telephone lines in operation.

Kiona, Wash.—The Kiona Valley Telephone Company has been organized at this place and the following officers elected: President, Dr. F. S. Hedger; vice-president, W. C. Warren; treasurer, W. A. Kelso; secretary, H. A. Shandy; directors, W. G. Warren, F. W. Rolph and George Findley. The work of construction will be commenced at once.

Springranch, Nebr.—Articles of incorporation have been filed with the secretary of state for the Springranch Telephone Company of Springranch, Clay County. The company has a capital stock of $800 paid up, and is limited to a total of $10,000. The incorporators of the company are W. F. McReynolds, L. J. Dana, P. C. O'Brien, William Ashby and others.

Morristown, N. J.—The Yamatine Manufacturing Company has been incorporated with a capital stock of $750,000. One of the purposes of the incorporation is the construction of telephone lines. The incorporators are George R. DeMontlord, John H. Roseyear and Edward A. Quayle, all of Morristown, N. J. The address of the company is 48 Water St.

Columbus Grove, O.—Columbus Grove is to have a farmers' mutual telephone company. At a recent meeting it was decided that the trustees, composed of Isaac E. Bogart, L. B. Good, and John Eversole, should borrow a sufficient amount of funds to purchase the necessary supplies to install the exchange. Madison L. Vanmeter was elected secretary of the company.

Cass City, Mich.—An effort is being made for the organization of a telephone company in Cass City. Articles are being prepared for the incorporation of the Cass City Telephone Company. It is the intention of the new company to connect with the Saginaw Telephone Company and also to co-operate with the farmers in the surrounding country in the construction of farmers' lines.

Patten, Me.—The Patten and Trout Brook Telephone Company has been organized at Patten for the purpose of maintaining and operating telephone lines between Patten village and Trout Brook Farm, so called, and intermediate points, with a capital stock of $2,500. The officers of the company are as follows: President, B. W. Howe, of Patten; treasurer, W. Scott Kellogg, of Patten.

Gibsonia, Pa.—John W. Thomas, Attorney, of Pittsburg, will make application to the governor of Pennsylvania for a charter for an Independent telephone company to be known as the North Pittsburg Telephone Company. It is the intention of the company to have its headquarters at Gibsonia and its lines to extend over Butler and Allegheny counties. Mr. Thomas is representing Robert M. Gibson, Frederick Burki, Ross R. Glasgow and others.

Stamford, Conn.—The Porto Rico General Telephone Company of this city has filed a certificate of incorporation in the office of the secretary of state. It has an authorized capital stock of $130,000, and is empowered by its franchise to construct and operate telephone and telegraph systems throughout the island of Porto Rico. The corporation shall begin business on a capital of $1,000. The incorporators are Frederic Culver of Hadlyme, Conn., Granville Whittlesey of Greenwich, and Generoso Candina of San Juan, Porto Rico.

Charleston, W. Va.—The Longdale Independent Telephone Company, main office in Hartford City, Mason county, has been incorporated to build and operate a general telephone system from Point Pleasant up the Ohio river and adjoining counties through West Virginia, to extend said lines across the Ohio river. The capital stock is $15,000, of which $4,000 has been subscribed and paid in. The incorporators of the company are as follows: C. B. Rickard, A. M. Belcher, W. F. Carter, G. C. Rippelse and W. R. Bower, all of Charleston.

Fulton, Ia.—Fulton business men have for the last few months been formulating plans for the organization of a mutual telephone company in this city to connect with the Farmers' Mutual Telephone Company, which operates extensively throughout the northern part of the state. At a recent meeting a permanent organization was formed with the following officers: President, Dr. G. H. Thompson; vice-president, Samuel McCullough; secretary, J. C. Snyder; treasurer, A. C. Williamson. The work of establishing the new service will be commenced as soon as material can be secured.

Cambridge, Md.—Articles of incorporation for the Hooper's Island and Golden Hill Telephone Company have been filed in the office of the clerk of the Circuit Court for Dorchester county. The capital stock is $2,500 and it is the purpose of the company to construct a telephone line through Hooper's Island to Golden Hill and perhaps to other parts of the county. The incorporators of the company are as follows: William F. Applegarth, Charles R. Mills, Henry A. Phillips, George W. Tyler, John M. Clayton, Alonzo Travers, Oscar A. Keene, John S. Boseman, and Benjamin F. Travers.

Trenton, N. J.—The Trans-Alaska-Siberian Railway Company has been incorporated in the office of the secretary of state with an authorized capital stock of $6,000,000. Its purpose is to connect the western hemisphere with the eastern by an all rail route, tunnelling under Behring Strait, and to install a telephone and telegraph sys-

tem. The incorporators are Loicq De Lobel of Paris, general delegate of the French, Russian, and American syndicates of the railway; J. and A. L. Waddell of Kansas City, delegates of the advisory board of consulting engineers of the railway; John Healy of Seattle, Wash., delegate of the western syndicate; William H. Black, Jersey City; and John R. Turner, New York. The new incorporation is the result of a contract entered into by a special commission appointed by the czar of Russia and Mr. De Lobel in 1906.

BURLINGTON, Vt.—An act to incorporate the Vermont Home Telephone Company, in which several Albany parties are interested, has been introduced in the House of Representatives at Montpelier. The Home Telephone Company's representatives came to Rutland and established a branch there. The Board of Aldermen granted them a franchise which was vetoed by the mayor and later passed by the aldermen over the veto. The incorporators named in the bill are Howard Hendrickson, Emanuel B. Toedt and Irving R. Coughtry of Albany; Irving H. Griswold, Samuel B. Rawson, Theodore M. Brush and Frederick H. Sudro of Elyria, Ohio; James H. Caldwell, Peter McCarthy and William C. Geer of Troy, N. Y.; Warner H. Baldwin, Le Roy W. Baldwin, Fred A. Field, James A. Merrill and Charles S. Caverly of Rutland. The capital stock is to be of any amount not exceeding $1,000,000, and shall be divided into shares of a par value of $100 each. The corporation may increase its capital stock to any amount not exceeding $2,000,000 if the stockholders holding a majority of the stock shall so vote. The bill calls for the government of the corporation by a board of three directors. The principal office is to be established at Rutland, and the organization meeting is to be held within three months after the passage of the act, which is now being considered by the committee on corporations.

ELECTIONS AND MEETINGS

HARMON, Ill.—The Green River Telephone Company has elected the following officers: President, Elmer Cotton; secretary, Benjamin F. Swab.

SHIPMAN, Ill.—The Shipman Telephone Company recently held its annual meeting, at which time officers were elected and various matters of interest to the company were discussed.

DISCO, Ill.—The Cedar Pole Telephone Company recently held its annual meeting and elected the following officers: President, J. L. Bradfield; secretary and treasurer, E. O. Belle Isle.

LERNA, Ill.—The Lerna Mutual Telephone Company has elected the following officers: President, John Riley; vice-president, J. L. Connell; secretary, R. G. Hall; treasurer, Mark Wortham.

HIGHLAND CENTER, Ia.—The Highland Mutual Telephone Company has elected the following officers: President, O. C. Stevens; vice-president, A. J. Rogers; secretary, Mr. Utterback; treasurer, Geo. Bane.

JAMES, Ia.—The James Mutual Telephone Company has elected the following officers: President, Grant Musser; secretary, Frank Woolworth; treasurer, Cyrus Atwood; directors, Hans Olsen, James Woodworth, Claus Junck.

TAYLORVILLE, Ill.—The Christian County Telephone Company has elected the following directors: Frank Brewer, J. S. Eaton, G. W. Winters, W. H. Jones, Stanley Jones, Warren Penwell, C. M. Parker, D. W. Johnston, and L. D. Hewitt.

MARQUETTE, Mich.—The Marquette County Telephone Company has elected the following directors: J. E. Sherman, D. W. Powell, Marquette; Alexander Maitland, E. C. Anthony, J. H. Winter, Negaunee; M. M. Duncan, H. O. Young, A. B. Minor, Ishpeming; D. T. Morgan, Republic.

MANITOWOC, Wis.—The Newton-Manitowoc Telephone Company has completed its organization by the election of the following officers: President, Adolph Rodewald, Newton; vice-president, Henry Bruckschen; secretary and treasurer, Edward Diedrichs. The company will build a line between this city and Cleveland.

SOUTH CORINTH, Vt.—At a recent meeting the Eastern Vermont Telephone & Telegraph Company elected the following directors: C. A. Washburn, So. Corinth; P. H. Darling, Corinth; A. T. Smith, West Topsham; Charles Mills, Orange; C. C. Coburn, West Fairlee; E. C. Poole, A. H. Batchelder, E. W. Thurber, H. M. Dickinson.

HEBRON, Me.—The stockholders of the Hebron Home Telephone Company recently held their annual meeting in this place and the following officers were elected for the coming year: President, J. L. Bumpus; vice-president and manager, C. H. George; secretary, J. E. Bailey; treasurer, C. W. Cummings; directors, A. G. Bowman, W. H. Alden, J. L. Bumpus, C. H. George, Austin Nelson, J. E. Bailey, and S. J. Whittemore. Reports show the company to be in good condition, with assets over $1,200 above the liabilities.

COLUMBIA CITY, Ind.—The annual meeting of the stockholders of the Whitley County Telephone Company was recently held in this city. Secretary W. H. Magley presented his report, which showed that the company is to-day doing a larger business than ever before. A recommendation for some extensive improvements was made and will be considered at the proper time. The old board of directors was reëlected, who at once reappointed the former officers, as follows: President, S. J. Peabody; vice president, G. A. Pontius; secretary and treasurer, W. H. Magley.

TRENTON, N. J.—The directors of the reorganized Inter-State Telephone and Telegraph Company recently met in this city and organized by electing the following officers: President and general manager, H. R. Swartz, Trenton; vice president, W. S. Hancock, Trenton; secretary, Barker Gummerer, Trenton; treasurer, C. W. Wright, Trenton. The company has exchanges in Trenton, Atlantic City, Elizabeth, Paterson, and Passaic, with 8,400 telephones. The company will develop the business with all the energy at its command and proposes within a year to have fully 25,000 telephones in service. The company has valuable assets in the shape of franchises and rights of way, and will soon spread all over the state.

WINCHESTER, Ind.—The annual meeting of the stockholders of the Eastern Indiana Telephone Company was held in this city recently. The reports of the secretary and manager showed the company to be in a prosperous condition. The directors were authorized to sell $15,000 additional stock to toll line extension. The old directors were reelected as follows: A. L. Nichols, L. A. Botkin, P. E. Goodrich, J. A. Browne, B. S. Hunt, R. J. Litschert, J. S. Engle, and J. M. Fletcher. The stockholders recommended a revision of the by-laws, changing the directors' meeting to quarterly instead of monthly, and creating an executive committee invested with the same power as the board of directors to transact all business between the sessions of the board. After the meeting adjourned the directors organized by electing the following officers: President, A. L. Nichols; vice-president, L. A. Botkin; secretary and general manager, J. A. Browne; treasurer, P. E. Goodrich.

GREENSBURG, Ind.—The stockholders of the Decatur County Independent Telephone Company recently held their annual meeting in this city. The financial statement of the past year's business made a very creditable showing, the profits for the year ending September 29 being $5,968.43. It was decided to raise the rates on residence telephones from 80 cents to $1, on office from $1 to $1.25, and on business houses from $1.25 to $1.50. It was suggested that the Central Union Telephone Company would consider a proposition to give up the local field if the Independent would turn over to them all the long distance business, but it was announced by the Independent directors that such an undertaking could not be considered for the reason that the local company is tied up in a contract with the Independent Telephone Company for its long distance business. The old directors were reëlected with the exception of M. E. Newhouse, who was succeeded by Noah DaShiell.

ORDINANCES AND FRANCHISES

LACONIA, N. H.—The Citizens' Telephone Company has been granted a renewal of its franchise.

SAPULPA, I. T.—S. H. Bevins has applied for a franchise to install a telephone system in Sapulpa.

HAMILTON, Mo.—The Hamilton Home Telephone Company, of Hamilton, expects to install additional cable.

PORTSMOUTH, O.—The New Boston council has granted a franchise to the Portsmouth Telephone Company.

ALLENTOWN, Pa.—The Consolidated Telephone Company of this city has been granted a franchise at Womelsdorf.

LAMAR, Colo.—The Transcontinental Telephone Company has made application for a telephone franchise in Lamar.

BELLEVILLE, Ill.—The Looking Glass Prairie Telephone Company has made application for a franchise in Belleville.

NORWOOD, O.—The Cincinnati Independent Telephone Company has applied for a franchise to operate in Norwood.

READING, Pa.—The Board of Works has granted the Consolidated Telephone Company the right to construct its lines in Reading.

VALPARAISO, Ind.—The Portage County Home Telephone Company has applied for a franchise to operate a telephone system in this city.

BRAINERD, Minn.—H. F. Mann has been granted admission to Brainerd for his telephone line from Garrison, and also for a local exchange.

GLENWOOD SPRINGS, Colo.—The Garfield County Telephone Company of Newcastle, has made application for a telephone franchise in this place.

CHARDON, O.—Action has been brought in the Probate Court by the Geauga County Telephone Company to secure a franchise in this place.

CHARLESTON, Ill.—At a recent meeting of the city council an ordinance was passed granting a franchise to the Citizens' Mutual Telephone Company.

HENDERSON, Ky.—The Central Home Telephone Company, which controls the Henderson Telephone and Telegraph Company of this city and nearly all the other Independent systems in Kentucky, is

seeking a twenty year franchise here. The Cumberland company is also seeking a franchise, and the two companies are preparing for a hard fight.

CENTERVILLE, Mo.—The Town Commissioners of Centerville have granted the Farmers' & Merchants' Telephone Company a franchise to construct a line to Centerville.

WILSON, N. C.—The Carolina Telephone Company of Wilson has obtained a new franchise and will install a new central energy telephone system at a cost of $25,000.

ELLENSBURG, Wash.—The North Kittitas Rural Telephone Company has applied for a franchise to construct and maintain telephone lines along certain county roads.

EVANSVILLE, Ind.—The application of the Citizen's Telephone Company for a franchise to install a telephone system in this city is being considered by the city council.

COALTON, O.—Spurgeon Jenkins and other Coalton business men have obtained a franchise from the Coalton village council to put in a new telephone system in Coalton.

ROCKLAND, Me.—The board of mayor and aldermen of Rockland has granted a permit to the Knox Telephone & Telegraph Company for conduits rights upon certain streets of the city.

FARGO, N. D.—The North Dakota Independent Telephone Company has purchased the Casselton and Valley City franchises and expects to secure control of the exchange at Wheatland.

HACKETTSTOWN, N. J.—The Hackettstown Telephone and Telegraph Company has secured the right of way to build a line to Hackettstown and has also applied for a franchise in this place.

CENTERVILLE, Md.—The town commissioners of Centerville have granted the Farmers' & Merchants' Telephone Company of Caroline County a franchise to build a telephone system in this place.

CASTLEDALE, Utah.—C. O. Harris, in the interests of B. F. Kierullf Jr. & Co. of San Francisco, has made application for a telephone franchise in this place; also in other towns in the county.

WALKER, Ia.—A petition is being circulated asking the town council to call a special election for the purpose of submitting to a vote of the people a proposition granting a franchise for a second telephone exchange.

MT. PLEASANT, Pa.—The charter recently applied for by the Citizens' Telephone Company of Mt. Pleasant has been granted. The company will start in business with a capital stock of $5,000 and will build lines in Mt. Pleasant township. The incorporators are H. E. Keck, W. B. Elliott, Harry Hunter, and others.

SIOUX FALLS, S. D.—The Potter County Telephone Company has been granted a franchise for constructing and operating a telephone system at Gettysburg. The construction of this system will give Gettysburg two telephone systems, the other being that of the Dakota Central Telephone Company. The new system will operate a number of rural lines.

PARIS, Ill.—The Wabash Telephone Company, through its attorney, Fred W. Dundas, has petitioned for a renewal of the franchise, which is soon to expire. The company is desirous of floating new bonds, and this cannot be done unless the franchise is extended. The matter has been referred to the city attorney, to report at an adjourned meeting of the council.

CHICAGO, Ill.—Two bids for a telephone franchise have been made to the committee on gas, oil and electric light. The two offers came from the Manufacturers' Telephone Company, backed by the Illinois Manufacturers' Association, and represented by Attorney Levy Mayer, and from Arnold Kalman, backed by St. Paul and Kansas City interests and represented by Attorney H. L. Stern.

NIAGARA FALLS, Ont.—The special committee of the city council which has been considering the offers of the telephone companies for a franchise will recommend to the council that the offer of the Stark Telephone & Light Company be accepted. The company does not ask for an exclusive franchise, the city can take over the plant at any time and the rates are considerably lower than those of the other competing companies.

LITTLE ROCK, Ark.—It is stated that the right-of-way has been secured and the material ordered for the construction of the first long distance line of the Telegraphone Company of this city. This line is to be built from Pine Bluff to Little Rock. The Telegraphone Company was organized last spring by a number of Independent owners in order to secure long distance connection throughout the state and in adjoining states.

CINCINNATI, O.—The Queen City Home Telephone Company, which was refused a franchise grant by the city council July 30 last, has filed suit in the Probate Court against the city asking that this court direct a mode whereby the company may construct telephone and telegraph lines along its proposed route. The petition sets forth that the company is willing to accept any terms and conditions to get a franchise. The suit was filed by Attorney C. B. Matthews.

SPOKANE, Wash.—The Farmers' United Telephone & Telegraph Company, financed by Walter and Albert Riggs and Anton Kramer of St. Andrews, Wash., has asked the commissioners of Douglas county for a franchise to build a line from Coulec City, 100 miles north and northwest, to enter the towns of St. Andrews, Jean, Mansfield, Bridgeport, Hold and Heahy. If the farmers' lines join, the company will have a complete service by Independent telephones reaching all over Douglas county.

WOODSTOCK, N. B.—Application has been made to the New Brunswick government for a charter incorporating a company with the title of the Mutual Telephone Company, for the purpose of constructing telephone lines in Victoria, Carleton, York, Sunbury, and Queen's counties. The prime mover in the project is H. L. Ross of Woodstock, and it is stated there are associated with him several local people who were shareholders in the old Union Telephone Company, which formed one of the local companies merged in the Central Telephone Company.

WICHITA, Kan.—A special meeting of the Municipal League was called recently for the purpose of discussing the subject of a telephone franchise. The city council has been asked by the telephone company to grant a new franchise or so amend the old one as to increase present telephone rates. As this is a matter concerning the general welfare of the community the league believes that the matter should be thoroughly discussed and resolutions either commending or condemning the proposed new franchise should be passed. The reason given by the telephone company for asking for a new franchise is that under the present franchise the rate is too low to admit of the management of the enterprise on a profitable basis.

UNDERGROUND CONSTRUCTION

MARSHALLTOWN, Ia.—The Central Telephone Company contemplates placing its wires under ground in this city.

JERSEY CITY, N. J.—The Coast Line Telephone Company has applied for permission to place conduits in the streets of this city.

WAVERLY, Ia.—The Corn Belt Telephone Company has been granted permission to place its wires underground in Waverly.

YOUNGSTOWN, O.—An ordinance has been passed requiring the Youngstown Telephone Company to place its wires underground in some of the streets of Youngstown.

PITTSBURG, Pa.—A crusade against telephone, telegraph, and electric light wires is to be made by the Pittsburg Board of Trade in the East End district and an effort will be made to have all companies put them underground. President T. D. Harmon of the board of trade will be prime mover in the matter. The issue is to be made one of the most important questions to be considered by the board of trade during the winter and if it is found that the subject is not controlled by ordinance, council legislation will be asked.

NEW CONSTRUCTION

CHAMPAIGN, Ill.—The Home Telephone Company will construct a new business block.

HOWE, Neb.—The Farmers' Mutual Telephone Company will install an exchange at Howe.

AURORA, Minn.—The Mesaba Telephone Company will install a central station at this place.

URBANA, Ill.—The Home Telephone Company intends to rebuild its entire system in this city.

MENDOTA, Va.—A movement is on foot to construct a telephone line from Mendota to Lebanon.

HERMISTON, Ore.—The Butter Creek Telephone Company of Pendleton is planning to build a line to Hermiston.

MCLOUTH, Kans.—The McLouth Telephone Company contemplates the construction of a telephone line to Stanwood.

FT. KENT, Me.—Under the direction of L. S. Black of Houlton the Aroostook Telephone Company will construct a line from this place to Ashland.

SPOKANE, Wash.—The Interstate Telephone Company will install a local telephone system at Post Falls, where it has had a franchise for some time.

STOUGHTON, Wis.—The farmers of this vicinity who recently organized a telephone company will begin the work of construction in the near future.

MASON CITY, Ia.—The Western Electric Telephone Company, with headquarters at Britt, Ia., will install a central energy telephone system at this place.

PORT HURON, Mich.—The Port Huron Telephone Company is planning new construction work which contemplates the installation of over eleven hundred feet of cable.

SANTA ROSA, N. Mex.—Burnett & Moore will soon begin the erection of a modern telephone system in Santa Rosa. They also contemplate installing an electric light plant.

CLEVELAND, O.—The Cuyahoga Telephone Company has purchased a site in the East End and will erect a new exchange building which will have a capacity of about 6,000 telephones. The com-

pany will shortly begin the construction of a conduit system for this exchange.

PINCHER CREEK, Alb., Can.—A telephone system will be installed at this place by J. E. Woods, manager of the Municipal Water Works and Electric Light Company.

NORWALK, O.—The local telephone company has completed arrangements with the Olena Telephone Company for the construction of a toll circuit from Norwalk to Olena.

MAPLE FALLS, Wash.—The Maple Falls Telephone Company has perfected plans to build a telephone line between this place via Deming to Bellingham. J. P. Asplund is president of the company.

ALLENTOWN, Pa.—Superintendent Charles West of the Consolidated Telephone Companies has completed arrangements to establish automatic suburban telephone exchanges at Emaus and Danielsville.

BEATRICE, Neb.—The New Home Telephone Company is installing a new central energy switchboard and within the next month or two will begin construction of a direct toll line in Tecumseh, Marysville and Pawnee City.

PROVOLT, Ore.—The officers and stockholders of the Applegate Valley Telephone Company are considering the matter of putting a rural telephone system through the valley and recently held a meeting to consider the matter.

LORAIN, O.—The Black River Telephone Company has placed a contract with F. S. Knox for the construction of a telephone line to Oak Point. The work of building the line will begin as soon as the material can be secured.

WYMORE, Neb.—The Independent Telephone Company, which is installing a central energy system in Beatrice, proposes to put in an up to date system here as soon as the system is completed at Beatrice, and promises much cheaper rates than now prevail.

PATON, Ia.—The Hawkeye Telephone Company of Des Moines is making arrangements to construct a telephone line connecting Beaver and Gowrie. The line will be built via Grand Junction, Dana and Paton, and it is expected the lines will be completed this fall.

CHIHUAHUA, Mex.—The Dolores Mines Company is considering the matter of building a telephone line from San Isidro station on the Temosachic branch of the Chihuahua and Pacific railroad to the Dolores mine owned by that company, a distance of about 100 miles.

PAOLA, Kans.—The Paola Telephone Company, which has recently installed a new toll board, contemplates the construction of a number of new lines, and the partial remodeling of its system. When the proposed changes are made the company will have a plant strictly up-to-date in every particular.

VALLEY CITY, N. D.—The Pomona Valley Telephone Company, which has recently succeeded the Edgeley Electric Telephone Company at Edgeley, will erect a new exchange building and will install a 200 capacity switchboard. A rural line will be built extending over thirty-five miles in the vicinity of Edgeley.

EVELETH, Minn.—The Mesaba Telephone Company of this city is planning to erect a new building. Not only will the building be one of which the city will be proud, but a new central energy switchboard of 400 capacity will be installed. The company is making many other improvements in the way of new wiring and poles made necessary by the size of the new exchange

ROME, Ga.—Plans are under way for the establishment of an Independent telephone system in Rome. Among those interested in the enterprise are A. L. Harlow, of Detroit, Mich.; John H. Reynolds, president of the First National Bank of Rome, and Hugh Reynolds, cashier of the Citizens' Bank. The proposed plan is for five hundred patrons to subscribe each for $200 worth of stock, $50 to be paid down and the balance in installments running five years. At the expiration of that time the subscribers will own the system. It is thought a system can be installed for $50,000 leaving $50,000 in the treasury as a working fund. Application will be made for a franchise.

COMBINATIONS

GAINES, Mich.—The Union Telephone Company and the Mutual Telephone Company have been consolidated in this place.

SUFFOLK, Va.—The stockholders of the Nansemond Telephone Company and the Virginia-Carolina Telephone Company are considering a proposition to merge the two corporations.

LITTLETON, Ill.—A deal has been consummated by which the lines of the Western Telephone Company and the Grange Telephone Company will be consolidated and the business will be conducted at this place as one company.

GRIMES, Ia.—The Big Creek Telephone Company of Polk City is being merged into a new company to be known as the Polk City Telephone Company and will put in a switchboard at Polk City. This company connects with the Farm Mutual Telephone Company of Grimes and will furnish free connection over its new board when installed, which will greatly add to the convenience of subscribers on both lines.

NOME, Alaska.—Articles of agreement have been signed for the consolidation of the Seward Co-operative Telephone Company and the Alaska Telephone & Telegraph Company and the affairs of the two companies will be conducted under the name of the Alaska Telephone and Telegraph Company, with A. E. Boyd as manager. The new company will have a capitalization of $300,000 and directors will be chosen from the stockholders of the two old companies.

ST. JOHN, N. B.—The shareholders of the Central Telephone Company have ratified the agreement of amalgamation with the New Brunswick Telephone Company. The agreement provides for the continuation of the joint business under the title of the New Brunswick Telephone Company, the shareholders of the Central Telephone Company receiving stock of the New Brunswick Telephone company at the rate of dollar for dollar of their Central Telephone Company stock. The New Brunswick Telephone Company's shares are to be reduced from $50 each to $10 each, the total number of shares being increased accordingly. The amalgamated company is to have fifteen directors, one of whom is to be chosen by the combined stockholders, and directors of the two companies will name seven each of the remaining fourteen.

EXTENSIONS AND IMPROVEMENTS

PORTLAND, Me.—The Automatic Telephone Company will improve its plant.

SAGINAW, Mich.—The Valley Telephone Company contemplates the extension of its lines.

NORTHEAST, Pa.—The Mutual Telephone Company intends to rebuild and greatly improve its system.

DEWITT, Nebr.—The DeWitt Telephone Company is planning to build several rural lines in the near future.

COLORADO, Tex.—The Texas and Pacific Telephone Company of this city will at once install a new 1,000-drop switchboard.

LEWIS, Ia.—The Lewis Telephone Company is planning many improvements, including the installation of a new switchboard.

SARATOGA, Wyo.—The Rural Telephone Company contemplates many improvements in its system. R. A. Day is president of the company.

BELLEVUE, O.—The Local Telephone Company contemplates installing new exchange and office equipment in its exchange at Greenwich.

SHENANDOAH, Ia.—The Mutual Telephone Company contemplates many improvements, which will make its plant up-to-date in every particular.

SHELBY, Tex.—Contract has been awarded to E. C. Haas of this city by the Brenham-Shelby Telephone Company for the improvement of its system.

WADSWORTH, O.—The Star Telephone Company contemplates the rebuilding of its system at this place, which will include the installation of a new switchboard.

MASSILON, O.—The Massilon Telephone Company contemplates many improvements in its system, including the installation of a new switchboard at an early date.

YOUNGSTOWN, O.—The Youngstown Telephone Company is planning many improvements in its system, the cost of which is estimated will be in the neighborhood of $100,000.

NEVADA, Ia.—The Nevada Telephone Company is constructing a telephone line connecting Nevada with Maxwell and it is also the company's intention to extend its lines to Cambridge.

MONROVIA, Ind.—The Monrovia Mutual Telephone Company has increased its capital stock with a view of installing a new switchboard and making other desired improvements.

NEWCASTLE, Pa.—At a cost of probably $25,000, the Citizens' Telephone Company will install an entirely new modern central energy switchboard and other improved equipment for use in this city.

PANA, Ill.—The Christian County Telephone Company contemplates many extensions and improvements, among which is the stringing of additional cable and the installation of a new switchboard.

WILTON, N. H.—The Wilton Telephone Company has voted to extend its lines through the Stephenson district in Lyndeborough, which will practically cover the whole of that town with the telephone system.

MANCHESTER, O.—As soon as the new exchange is installed at this place a metallic circuit will be established between Manchester and Waverly, which will work in connection with the Home Telephone Company of Waverly.

PALESTINE, Tex.—The Palestine Telephone Company will install new telephones in the near future. It is the intention of the company to also build new and modern offices. It is said that when the contemplated improvements have been finished that the ex-

penditures will amount to nearly $20,000 and will give Palestine one of the best telephone systems in the state.

LE SUEUR, Minn.—The Cannon Valley Telephone Company is planning extensive improvements in this section. Numerous extensions will be built to its farmers' lines, the most extensive being west and north of this place.

COLUMBIA CITY, Ind.—The directors of the Whitley County Farmers' Mutual Telephone Company have decided to expend a large sum in the installation of new equipment and for the purpose of making numerous improvements.

DUNDEE, Ill.—A decided increase in its business in Dundee and Carpentersville has led the Interstate Telephone Company to make plans to extend its lines from this place to Burrington and Algonquin, work to begin in the near future.

SPOKANE, Wash.—The Empire Construction Company has begun work on the construction of the Home Telephone Company's lines and it is stated work will be pushed. The wires in the business districts of the city will be placed underground.

GALESBURG, Ill.—L. E. Cutler, manager of the Mutual Union Telephone Company, is making arrangements to make extensive improvements in the system. A new switchboard, new cables, etc., have been purchased and will be installed at once.

ROUND LAKE, Minn.—The Brewster & Round Lake Telephone Company is installing a local exchange at Round Lake. In addition to this local improvement the company expects to build a ten mile farmer line extending out from Round Lake.

CLAY CITY, Ky.—The Clay City exchange of the East Kentucky Telephone & Telegraph Company, recently acquired by the People's Independent Ice & Coal Company of St. Louis, will share in the improvements on which the company expects to expend $10,000.

RENO, Nev.—R. T. Roy, F. R. Lamb, and others are interested in a project to establish a telegraph and telephone system for the various camps in Churchill county. It is proposed to connect Wonder, Fairview, Stillwater, Fallon, and Eastgate by the way of Hazen or Lovelock.

CHESTERTON, Ind.—The Northern Indiana Telephone Company has decided to install a modern switchboard in its exchange at this place. The company recently completed local exchanges at Lowell and St. John, and is now planning for a number of extensions and improvements.

FRANKLIN, Pa.—Among the many improvements planned by the Petroleum Telephone Company is the installation of a new switchboard and the installation of eight miles of cable, making the plant entirely cable. These increased facilities have been made necessary to meet the increased business of the company.

WRIGHTS, Ill.—Barnard Brothers, operating exchanges at Wrights and Rockbridge contemplate incorporating their interests at these two places under the name of the Wrights Telephone Company. The exchange at Wrights has 200 miles of wire and seventy telephones in service and represents an investment of $5,000. Additional extensions are planned by the company.

JEFFERSON, Ia.—The Farmers' Mutual Telephone Company of this city is contemplating some extensions and improvements in the near future, among which is the addition of 1,000 feet of 50-pair cable. The company has reached its limit in cable capacity, and is forced to take this step. There are now 347 telephones on the Jefferson exchange, 160 of which are city telephones and the rest farm lines.

FULTON, Mo.—The Buffum Telephone Company is planning many improvements in its system at this place, which will include the installation of a new switchboard and will entail the expenditure of something like $100,000. It is the intention of the company to later rewire the entire city, and thoroughly overhaul the present exchange. It is estimated the latter improvements will cost in the neighborhood of $25,000.

OWENSBORO, Ky.—Extensive improvements in the plant and the lines of the Home Telephone Company of this place have been decided upon by the new owners, the Central Home Telephone Company. A large part of the system will be reconstructed. The construction work, however, will not begin before spring. The capacity of the system will be enlarged. For some time the company has been unable to increase the number of its subscribers, as the switchboard would accommodate no more.

MATTOON, Ill.—The Mattoon Telephone Company has begun the reconstruction of its lines throughout the city. Decided changes and improvements will be made and it will require about a year or so before the work is completed. For several months the company has been placing some of its cables in conduits underground and much more of this work will be done. A new modern central energy switchboard will be installed. New office equipment will also be installed and when completed it will be one of the most up to date telephone systems in the country, having all the modern improvements.

FINANCIAL NOTES

RISING SUN, Ind.—The Ohio River Telephone Company has increased its capital stock to $75,000.

FIELDON, Ill.—The Western Telephone Company has increased its capital stock from $960 to $1,960.

BATTLE CREEK, Nebr.—The Battle Creek Telephone Company has increased its capital stock to $30,000.

LANCASTER, O.—The Lancaster Telephone Company will pay a 1½ per cent dividend on its preferred stock.

LIBERTYVILLE, Ill.—The Lake County Telephone Company has increased its capital stock from $10,000 to $25,000.

SUNBURY, O.—The Sunbury & Galena Telephone Company has increased its capital stock from $25,000 to $50,000.

BALDWIN, Mo.—The Baldwin Mutual Telephone Company has increased its capital stock from $2,000 to $12,000.

ALBANY, N. Y.—The Albany Home Telephone Company has declared its regular quarterly dividend of 1 per cent.

SPRING VALLEY, Ill.—The Spring Valley Telephone Company has increased its capital stock from $10,000 to $15,000.

WATERVILLE, Minn.—The Canon Valley Telephone Company has increased its capital stock from $50,000 to $100,000.

CHAMPAIGN, Ill.—The Home Telephone Company of this city has increased its capital stock from $100,000 to $200,000.

REDLANDS, Cal.—The Southwestrn Home Telephone Company has declared its regular quarterly dividend of 1¼ per cent.

CANADIAN, Tex.—The Stockman's Telephone Company has filed an amendment to its charter increasing its capital stock from $5,000 to $10,000.

JACKSONVILLE, Ill.—An adjourned meeting of the Illinois Telephone Company was held recently and the regular semi-annual dividend of 4 per cent was declared.

ROME, N. Y.—The directors of the Wire & Telephone Company of America have declared a dividend at the rate of 6 per cent a year on the preferred stock of the company to July 1, 1906.

CLEVELAND, O.—The United States Telephone Company has issued $1,100,000 of its common and $361,800 of its preferred stock to complete the acquisition of the northern Ohio companies taken over some time ago.

MT. VERNON, O.—The Mt. Vernon Telephone Company has increased its capital stock from $150,000 to $250,000. The money from the additional stock will be used for the extension of the lines and making improvements required by the rapid growth of the town.

FT. WAYNE, Ind.—The directors of the Home Telephone Company recently declared the regular semi-annual dividend of 2½ per cent on the common stock. The dividend of 6 per cent per annum on the preferred stock will be declared at the annual meeting of the company on January 6.

ABINGDON, Ill.—The Mutual Union Telephone Company has increased its capital stock from $10,000 to $15,000. The company has recently installed a new 450-line switchboard and 100 new telephones and has purchased the thirty miles of toll line heretofore owned by the North Fulton Telephone Company.

PHILADELPHIA, Pa.—The Keystone Telephone Company of Philadelphia, including the Keystone Telephone Company of New Jersey and the Keystone State Telephone & Telegraph Company, for the month of September shows gross earnings to be $70,742 as against $60,353 in 1905; net earnings, $31,503 for 1906 and $32,169 for 1905.

LIMA, O.—For the purpose of making extensions to the underground system the Lima Telephone & Telegraph Company will sell forty shares of cumulative preferred stock, at $105 per share. This stock pays 3 per cent semi-annual dividends, payable February 1 and August 1 of each year. Geo. H. Metheany is secretary and manager of the company.

MILBANK, S. D.—At a special meeting of the stockholders of the Grant County Telephone Company, held recently, it was unanimously resolved to authorize the directors to issue a special block of stock to present stockholders to the amount of $12.000 at the special price of $30 a share. The money will be used solely to wipe out the current floating indebtedness.

GOLDFIELD, Ia.—The Goldfield Telephone Company has filed amended articles of incorporation with the recorder, by which the capital stock is increased from $10,000 to $20,000. This is one of the most prosperous mutual telephone companies in Iowa and is paying big dividends. The money secured by an increase in capital stock will be used in building new rural lines.

SCHENECTADY, N. Y.—The General Electric Company has voted to increase the capital stock by $20,000,000, making the total amount $80,000,000. Of this amount $11,000,000 will be offered to stockholders at par. The new stock will be used for extensions and increasing the working capital of the company. The company will

expend between $5,000,000 and $6,000,000 for extensions during the next year.

JACKSON, Miss.—The quarterly report of the Meridian Home Telephone Company, which has reached the railroad commission, shows the following results for the quarter ended September 30: Receipts, $6,978.21; operating and other expenses, $3,195.72—giving a balance of earnings of $3,782.49. Deducting from this balance the interest on bonds, a net balance is shown of $1,285.19.

HAMILTON, O.—The directors of the Hamilton Home Telephone Company have declared their fifteenth quarterly dividend to their common stockholders. The company has had an unusually prosperous period during the last three months, with a net gain of about 300 telephones. There are approximately 2,200 subscribers connected with the Hamilton plant and connection with over 4,000 subscribers in Butler county.

ERIE, Pa.—The stockholders of the Mutual Telephone Company have voted to increase the captital stock of the company from $150,000 to $500,000. It is the object of the company to dispose of such stock as is necessary to meet requirements from time to time. The immediate needs of the company include an extension to the building now in course of construction, new cable and a new switchboard. These improvements have been made necessary by the increased business of the company.

CLEVELAND, O.—The Cuyahoga Telephone Company has disposed of an additional $100,000 of preferred stock. The proceeds of the loan will be used to reduce the floating debt of the Cuyahoga Telephone Company. The company has remaining about $100,000 preferred stock which it can sell at any time it needs to do so. When this is done it will dispose of the last of the preferred and common stock, all of both issues being then outstanding. The bond issue remains the same, that is, $2,700,000.

GREEN BAY, Wis.—At the first annual meeting of the Brown County Telephone Company, held in this city recently, a semi-annual dividend of 6 per cent was declared. The financial affairs of the company were found to be in excellent shape. It is only since last March that receipts have been coming into the company's treasury, so the earnings are for eight months. The following officers were elected: President, C. A. Straubel; vice-president, H. F. Hagemeister; secretary and treasurer, F. J. B. Duchatau.

BUTLER, Pa.—At a meeting of the directors of the People's Telephone Company, it was resolved that the company should borrow $50,000 to be used in the improvement of the system and that the sum be raised by the sale of bonds to be issued by the company, the denomination of such bonds to be from $100 to $1,000 and to bear interest at the rate of 5 per cent per annum, exclusive of tax, interest payable semi-annually, said bonds to be made payable in ten years with the option reserved to the company to redeem any or all of the bonds at the end of any interest paying date.

SPOKANE, Wash.—The Interstate Telephone Company of this city has increased its capital stock from $20,000 to $100,000. Amended articles of incorporation providing for the increase of capital have been filed with the secretary of state at Olympia. The Interstate company was organized to transact a general telephone business in Washington, Idaho, Oregon and Montana. It has a telephone system now in operation in northern Idaho. M. A. Phelps, president of the company, recently stated that the stockholders had approved of a proposition to increase the capital stock in order to extend the company's lines and enlarge its business.

PORTLAND, Me.—The vote of a year ago converting a part of the Northeastern Telephone Company's common stock into preferred and exchanging for a block of outstanding bonds a prescribed amount of the preferred stock, was rescinded at a special meeting of the stockholders, held recently. The action had been opposed by the minority holders of common stock, and the Maine Supreme Court had granted a temporary injunction to restrain the directors of the company from carrying into effect the recorded vote. The company has an automatic telephone system in this city. A majority of the stock is held by Scranton, Pa., people, who constructed the local lines. The action by the company rescinding the vote in question ends the litigation and restores peace within the corporation.

CLEVELAND, O.—It is stated that both the United States Telephone Company and the Cuyahoga Telephone Company are showing an increase of about 20 per cent in gross receipts, together with a considerable increase in net earnings. In the case of the United States Telephone Company recent reports show that operating expenses are actually less than during the corresponding period a year ago. This carries more than the actual gain in gross receipts, therefore, to the net earnings. The surplus, however, does not show a corresponding increase in view of the fact that the dividends of the United States Company have been increased in the meantime. In the case of the Cuyahoga Company the gain in gross has been about 20 per cent, while the gain in net earnings will show about 15 per cent.

FORT WAYNE, Ind.—The action of the board of directors of the Home Telephone Company in adding 2 per cent to the customary dividend of 1½ per cent semi-annual has had the effect of attracting attention of investors toward that security. The capital stock of the company is $250,000 common, on which this dividend is to be paid (2½ per cent semi-annually), and this is above and apart from the stated 3 per cent semi-annual cumulative dividend due January 1 next on the preferred stock, of which nearly $250,000 has been issued. The company includes all the thousand miles of toll line taken over from the old National company and four outside exchanges. The toll line business since the new $6,000 toll board has been installed has grown rapidly, and both in exchange receipts and toll line receipts the increase of the present year over any other previous year breaks all records.

PERSONAL MENTION

BARNUM, Minn.—J. S. Cain has taken charge of the local telephone system at Barnum.

CRESTLINE, O.—H. H. Smith of Prospect, O., has been appointed manager of the local telephone system.

CLARKSVILLE, Tex.—M. T. Goodman has been appointed manager of the Home Telephone Company of this place.

MILFORD, Ia.—L. O. Pillsbury has resigned his position as manager of the Midland Telephone Company of this place.

MIAMISBURG, O.—T. E. Focht of Dayton has been appointed manager of the Home Telephone Company at this place.

CRESTON, O.—Hiram Snyder has resigned his position as manager of the Star Telephone Company's exchange at this place.

MT. HOLLY, N. J.—C. A. Wagner has been appointed manager of the Inter-State Telephone Company's exchange at this place.

ANITA, Ia.—F. H. Stacy, formerly of this place, has accepted the management of the West Bend Telephone Company of West Bend.

NORWALK, O.—H. R. Sykes of Plymouth, O., has assumed the management of the Norwalk exchange of the local telephone company.

BEDFORD, Ind.—Mr. F. Bingham of Cuyahoga Falls, O., has been appointed manager of the Independent telephone system at this place.

ST. JOHN, N. B.—Mr. F. H. Thomson has resigned his position as general manager of the New Brunswick Telephone Company of this city.

SHENANDOAH, Ia.—M. H. Driftmeyer of Clarinda has been appointed superintendent of the Mutual Telephone Company's system at this place.

AUSTIN, Tex.—V. I. Holcombe, formerly of Tennessee, has recently taken charge of the plant of the Texas Telephone Company at this place.

GREENSBURG, Ind.—E. M. Hart, who has resigned his position with the Citizens' Telephone Company, has been succeeded by William F. Qualls.

GREENVILLE, Ill.—George P. Player, of St. Louis, has been appointed manager of the Bond County Telephone Company, succeeding O. E. Jackson.

LAKOTA, N. D.—C. E. Johnson has resigned his position with the Lakota Telephone Company and will accept a position with the Northern Telephone Company of York.

ROCK ISLAND, Ill.—E. J. Burns, for the past three years manager of the Rock Island and Moline offices of the Union Electric Telephone Company, has resigned his position.

SUNBURY, Pa.—H. N. Daniell, division superintendent of the United Telephone and Telegraph Company, has resigned his position to enter the employ of the company at Scranton.

Owosso, Mich.—Harry Sexton has been appointed local manager of the Union Telephone Company to succeed H. T. Clough, who was recently promoted to the position of district manager.

NEWCASTLE, Pa.—I. H. Furbush, formerly electrician with the Erner-Hopkins Company of Columbus, O., has accepted the position of manager of the Independent Telephone Company in this city.

INDEPENDENCE, Ia.—D. A. Mann, manager of the Corn Belt Telephone Company at this place, has resigned his position and will be succeeded by W. Shafer, who has had charge of the construction work here.

SULLIVAN, Ill.—James L. Kirk has resigned his position as manager of the Sullivan Telephone Company and will take charge of the local exchange at Beloit, Kan. He will be succeeded by A. O. Harrison of Rantoul.

OWENSBORO, Ky.—Mr. Paul Ford, for some time manager of the Home Telephone Company at Ensor has resigned his position to take one with the company in this city. Arthur Douthitt has been appointed manager at Ensor.

LOS ANGELES, Cal.—C. C. Craig of the Home Telephone Company has resigned his position as assistant manager to accept that of general manager for the Northwestern Long Distance Telephone Company of Oregon and Washington.

CLEVELAND, O.—Hugh E. Elwell, Columbus district operator for

the United States Telephone Company, has been promoted to the position of traffic manager for the company, with headquarters at this place, to succeed E. D. Kramer, resigned.

OWENSBORO, Ky.—H. K. Cole, manager of the Home Telephone Company has resigned his position to accept the secretaryship of an insurance company in Louisville. Mr. Cole is one of the oldest telephone men in the state, in point of active service.

OWASSO, Mich.—H. T. Clough, local manager of the Union Telephone Company, has been promoted to the position of manager of the eastern Michigan district. Since January, 1901, Mr. Clough has built up the local business from 420 telephones to over 1,500.

BUFFALO, N. Y.—G. H. Wilder has resigned as manager of the Citizens' Telephone Company of Akron, and has accepted a position with the Inter-Ocean Telephone & Telegraph Company of this city. Mr. Wilder will be succeeded at Akron by Franklin Davis of LeRoy.

ST. LOUIS, Mo.—H. L. Parker, formerly of the Mountain State Electrical Company of Wheeling, W. Va., is now manager of the telephone department of the Commercial Electrical Supply Company of St. Louis. Mr. Palmer has a wide acquaintance in the telephone field and will no doubt be a valuable addition to his present employer.

WATERLOO, Ia.—C. W. Ayers, who has charge of the Corn Belt Telephone Company's exchange at this place for a number of years, has taken charge of the company's exchange at Waverly. Mr. Ayers will have general supervision of the exchanges at Waverly, Tripoli, Frederika, Denver, and Nashua. Under Mr. Ayer's management the exchange at this place has been built up in a most substantial manner.

LOWELL, Mass.—Mr. Cecil Adams, promoter and representative of the Merrimack Valley Telephone Company, will make application for the right to lay conduits in the streets. The order granting a franchise to the company was vetoed by the mayor and the veto was later sustained by the aldermen. Mr. Adams believes that the charter does not give the mayor power to veto a franchise, and he only awaits the arrival of a $10,000 bond to carry the case to court for testing.

INDIANAPOLIS, Ind.—Harry S. New, who recently resigned as president of the Indianapolis Telephone Company and as first vice-president of the New Long Distance Telephone Company, has been succeeded as president of the Indianapolis company by James S. Brailey, Jr., of Toledo, O., who was also made president of the New Long Distance company. Mr. New continues as director in both companies. Mr. Brailey, who is now president of both companies, owns probably one-fourth of all the stock of each.

WALLA WALLA, Wash.—J. E. McGillivary, district manager of the Pacific States Telephone & Telegraph Company has tendered his resignation and expects to be relieved of the management of the Walla Walla exchange by the first of the year. Mr. McGillivary expects to remove to Seattle where he will go into business for himself, engaging in the work of telephone engineering and construction. Mr. McGillivary is one of the best known telephone men in the northwest. He has been in the employ of the company for 11 years.

KANKAKEE, Ill.—A. J. Vernier of the Easteren Illinois Telephone Company of this city has drawn up incorporation papers for the new telephone company which he is promoting in Pontiac, Ill. The company came to this city and investigated the Kankakee plant about a month ago, when the movement was first started, and the investigation proved so satisfactory that over $200,000 worth of stock has been sold. The construction will be started at once and rushed along so that the exchange can be opened up in the early spring. Mr. Vernier has made arrangements for a temporary office and will divide his time between Pontaic and Kankakee, so that he can look after the construction.

TRANSFERS

TOLEDO, Ia.—W. C. Fider has sold the Toledo telephone exchange to Dr. Lathrop of Tama.

DALLAS, Tex.—S. M. Redburn of this city has acquired the Commerce Telephone Company.

JOHNSTOWN, Pa.—The Johnstown Telephone Company has acquired the Lorain Steel Company's Exchange.

FAYETTE, Ill.—The Fayette Telephone Company has been purchased by R. E. L. Smith, the purchase price being $1,818.

EDGELEY, N. D.—The Pomona Valley Telephone Company has succeeded to the Edgeley Electric Company at this place and will enlarge and improve the system.

MINERAL, Kans.—Mr. Will Nelson has purchased the Mineral Telephone Company and will rebuild the entire system and extend the lines.

ELGIN, Minn.—The Elgin Telephone Company has been purchased by the Greenwood Prairie Telephone Company and merged with that company.

DEKALB, Tex.—Guy Moore, who some time ago purchased the DeKalb telephone exchange, formerly owned by S. C. Minnick, has taken possession of same.

FAIRFIELD, Ill.—The Wayne County Telephone Company operating exchanges at Fairland and also at Albion, has sold its interests at the latter place to Arch Bassett, of Salt Lake City.

STITES, Idaho.—The telephone line between Lowe and Trimway belonging to the farmers' cooperative line has been purchased by Dr. Alcom and will be extended to Stites and Green Creek.

CLARENDON, Tex.—It is stated that T. L. Benedict of Denver, Colo., has purchased the half interest of E. H. Decker, manager of the Clarendon Telephone Exchange, and will improve the system.

SALISBURY, Mo.—The Salisbury telephone system has been purchased by J. C. Belshe, formerly owner of the Milan Telephone Exchange. The new management will greatly improve the plant.

FLORA, Ind.—The Flora Telephone Company has again changed hands and is now owned by a new company with the following officers: President, F. P. Lyons; secretary, W. E. Callane; treasurer, J. V. Bright; directors, R. R. Bright, J. V. Bright and Warren Knapp.

KINCAID, Kan.—The Eastern Kansas Telephone Company of Kincaid recently acquired by purchase ten miles of metallic toll line from the Bell. The Eastern Kansas company now controls a large part of the toll business of Anderson, Allen, Linn and Bourbon counties.

TAMA, Ia.—C. W. Smith, recently engaged in the telephone business at this place and Toledo, has purchased a new and up to date exchange at Primghar. The plant consists of 200 telephones and the exchange has country connections. The price paid for the plant was $4,800.

BEND, Oreg.—The Deschutes Telephone Company has purchased the telephone line between Prineville and O'Neil, formerly owned by the O'Neil brothers. This will give Bend direct service to O'Neil and many rural lines will be connected with the system. The company intends to extend its lines in all directions, building up a large rural system.

TICONDEROGA, N. Y.—The Schroon Lake Telephone Company has passed into the hands of the Ticonderoga Telephone Company. It is the intention of the new owners to make many changes and improvements in the newly acquired property. The plant is to be made an all metallic circuit and a trunk line will be built from this city to Schroon Lake.

SOUTH LYON, Mich.—The South Lyon Telephone Company, which was organized by South Lyon capital three years ago, has sold its plant to the Livingston Home Telephone Company for $12,000. The South Lyon Telephone Company has 300 miles of lines and 300 telephones in operation, and the deal netted a neat profit in the investment.

COOPERSTOWN, N. D.—The Cooperstown Telephone Exchange and all the country lines, together with the Binford exchange and rural lines running therefrom, has been sold by Andrew Goff to a syndicate of Cooperstown business men. Mr. Goff started the Cooperstown exchange seven years ago with 40 subscribers and has built up one of the best exchanges in the state.

COLUMBUS, O.—Ohio men have purchased control of the Deschutes Telephone Company of Bend, Oregon, and in the reorganization of the company they have become prominent in the management. The lines of the company cover central Oregon and the system will be greatly extended. The new officers of the company are as follows: President and treasurer, W. E. Guerin; vice-president and assistant secretary, E. B. King; secretary, R. D. Wickham.

BURLINGTON, W. Va.—The Chesapeake & Potomac Telephone Company has transferred all its country lines in the vicinity of Keyser, W. Va., to the Burlington company. The Burlington Telephone Company, which includes George B. Shank, A. A. Welton and J. P. Miller, leading residents of Mineral county, W. Va., now has control of an extensive system extending over practically all the territory south and east of Keyser to the Virginia line. The company will install a modernly equipped central exchange in Burlington.

SHELBYVILLE, Ky.—The Shelby County Telephone Company has been sold to residents of Shelby and Henry counties. Heretofore the company has been owned by residents of Virginia. The officers of the company are as follows: President, W. J. Thomas; vice-president, J. S. Turner; secretary, E. J. Doss; treasurer, J. C. Burnett. Others composing the company are C. S. Weakley, B. A. Thomas, J. C. Bright, J. C. Beckham and J. C. Burnett of Shelby, and John A. Crabb, J. C. O'Bannon, George C. Turner, W. S. Wilson, E. H. Smith, L. K. Smith and W. W. Turner of Henry county.

GLEN GARDNER, N. J.—A deal has been consummated whereby the Lebanon Telephone Company becomes the owner of the local telephone line operating at this place, at Hampton Junction, and at Asbury, with switching stations and long distance connections at Hampton Junction. This line was built a little more than a year ago under the direction of the Pennsylvania Telephone Company, of which it was a sub-licensee. It is stated that the Lebanon Telephone

Company, which already has 300 telephones in operation, will extend the line to Bloomsbury and connect with the Delaware Valley Telephone Company at that place.

ASSARIA, Kan.—The Assaria Mutual Telephone Company has purchased the Assaria exchange from the Salina Telephone Company and will take possession at once. This does not include toll lines running into Assaria owned by the Salina company, but the Salina company will be enabled to furnish its patrons the same long distance service that has existed before. The Assaria Telephone Company was organized several months ago and for some time contemplated the construction of an exchange of its own. Recently two carloads of equipment have arrived at Assaria for the Assaria company, but it is understood that the Salina company will use these supplies for the improvement of its service at other points.

St. Joseph, Mo.—The entire stock of the Citizens' Telephone Company has passed into new hands and the property is now in charge of Theodore Gary of Macon, Mo., A. A. Godard of Topeka, and William F. Rankin of Tarkio, Mo. The following new officers have been elected: President and general manager, Theodore Gary; vice-president and chairman of the board of directors, A. A. Godard; secretary and treasurer, H. E. Scovein, and H. L. Gary of Macon. It is the purpose of the new owners to immediately pay all of the outstanding debts of the company, amounting to $130,000 and the capital stock will be increased from $150,000 to $1,000,000. An up to date plant of underground construction with a capacity of 8,000 subscribers will be installed and a new fireproof building will be erected. When all improvements are completed the investment will be in excess of $1,000,000. Mr. Gary is president and general manager of the Independent telephone companies in a number of Kansas and Missouri cities and is vice-president of the International Independent Telephone Association. Mr. Godard is president of the State Savings Bank in Topeka and was for three years president of the Kansas State Independent Telephone Association. Mr. Rankin of Tarkio is a wealthy banker and cattleman. Negotiations have been pending since the latter part of July. It is the purpose of the company to give the best service possible.

LEGAL ITEMS

PARIS, Ill.—James C. Vance has brought suit against the Wabash Valley Telephone Company for $3,000 damages for injuries sustained while in the employ of the company alleged to be due to the negligence of the company.

TERRE HAUTE, Ind.—Edward Hayes, in the Superior Court, asks for judgment for $10,000 for damages sustained while in the employ of the Citizens' Telephone Company, by coming in contact with a live wire, which he asserts was due to neglect on the part of the company.

FRANKFORT, Ind.—An important damage suit is to be tried against the Central Energy Telephone Company of Frankfort. The plaintiff is suing for $10,000 for the death of his wife, occasioned by a current of electricity while attempting to use the telephone. The case will be watched with considerable interest by the telephone people throughout the state.

BALTIMORE, Md.—A verdict for the Maryland Telephone Company was rendered recently by the Superior Court jury in the suit for $10,000 damages brought against the company by Richard T. Smith for injuries received by him October 31, 1905. Smith claimed to have been struck and injured by a ladder which projected from a wagon of the company as it turned the street corner.

RED LODGE, Mont.—The Mutual Telephone Company of Billings and Red Lodge, acting on the advice of its president, P. B. Moss, of Billings, has applied to Judge Frank Henry of the Sixth Judicial district for an injunction restraining the unions of Billings and Red Lodge from enforcing their demands in the matter of the removal of mutual telephones or from interfering in any way with the company in the transaction of its business.

LOUISVILLE, Ky.—Judge Evans of the federal court granted a temporary restraining order against the city prohibiting the city from carrying into effect the new telephone rates in accordance with the ordinance signed by Mayor Barth. The signing of the ordinance was the first step toward municipal regulation. A hearing for a permanent injunction has been set for December 8. The ordinance, which made business rates $4 a month and residence from $2 to $3, was to take effect immediately.

NASHVILLE, Tenn.—Chancellor John Allison rendered his decision in the case of the Long Distance Telephone Company against the Mayor and City Council of Nashville, deciding the case against complainant. This is the case in which the Independent Telephone Company was granted a temporary injunction against the city interfering with the construction of its line through Nashville. It has been generally understood that the case will go to the Supreme Court, either way it was decided, and it is supposed that appeal will be made at once.

VILLISCA, Ia.—An order has been secured from Judge Macy at Council Bluffs restraining Dr. F. S. Schadel, receiver, from selling the Montgomery County Telephone Company's property to pay off its indebtedness. The action was taken by Attorney Hayner of Marengo, Ia., in behalf of the stockholders in this company who reside at that place. Stock to the amount of $17,000 is held by the Marengo people. At a meeting of the board of directors of the company, held recently, Beesen & Ratcliff were appinted attorneys for the company. Application will be made at the November term of court to terminate the receivership. The stockholders of the company have agreed to pay off the indebtedness of the company and will operate the plant without interruption. The Montgomery County Telephone Company was capitalized at $40,000, of which about $20,000 is preferred stock. The monthly receipts of the office are in the neighborhood of $650 and the monthly expenses about $400. The company's headquarters is Red Oak.

MISCELLANEOUS

HELENA, Ark.—A modern central energy telephone system will be installed in Helena.

GUYMAN, Okla.—A complete telephone exchange will soon be installed in this place.

BRADSHAW, Neb.—The Bradshaw Telephone Company is extending its lines to Hordville.

PRIMGHAR, Ia.—An effort is being made to establish a second telephone exchange at Primghar.

SALT LAKE CITY, Utah.—Salt Lake City is to have a branch factory for the manufacture of the telegraphone.

PORT ARTHUR, Tex.—The Texas Telephone Company is overhauling and rebuilding its system at this place.

OXBOW, Man., Can.—Citizens of this place have applied for the incorporation of a municipal telephone company.

BENWOOD, W. Va.—The National Telephone Company of Wheeling is rebuilding its telephone system at this place.

ARCOLA, Ill.—S. L. Woodworth & Sons are installing a new 300 capacity switchboard, which will greatly improve the service.

METAMORA, Ill.—The Metamora Telephone Company has just completed improvements on its system to the amount of $1,000.

QUINCY, Ill.—The Home Telephone Company is constructing a line to Hanibal, where it will connect with the Bluff City exchange.

VALLEY CITY, N. D.—The Valley City telephone exchange has 1,114 telephones in service. The system includes 510 miles of rural wire.

RUSHVILLE, Ind.—The Rushville Co-operative Telephone Company is extending its system in this city to take care of its increasing business.

DIKE, Tex.—Farmers in this vicinity are considering the organization of a stock company for the purpose of conducting a telephone business.

SHELBY, Ia.—An effort is being made to organize a farmers' telephone company in Shelby and a meeting was recently held with that purpose in view.

UNION CITY, Ind.—The Independent Telephone Company, operating in the vicinity of Union City, is making an effort to establish an exchange in this place.

COLOMBUS, Ga.—The Columbus Automatic Telephone Company of this city has placed an order for $15,000 additional equipment for its exchange.

MINNEAPOLIS, Minn.—The Tri-State Telephone Company has arranged to furnish a fire-alarm system and also a police service, without cost to the city.

NEWARK, N. Y.—The Wayne-Monroe Telephone Company contemplates moving its central office from Marion and uniting it with the exchange at this place.

CAMDEN, N. Y.—A manufacturing plant will be established at this place by M. P. Osborne & Son for the manufacture of telephones and electric light supplies.

AUBURN, N. Y.—Owing to being obliged to place its wires in the new subways, the Auburn Telephone Company announces that it will be obliged to increase its rates.

SPRING VALLEY, Ill.—The Spring Valley Telephone Company has commenced the installation of a new telephone exchange, which will give the subscribers better service.

NEW BOSTON, Tex.—The New Boston Telephone Company reports a very steady increase in the number of its connections. J. E. Anderson is manager of the company.

CHICKASHA, I. T.—A new switchboard is being installed by the local telephone company. It is the intention to overhaul the lines and put the system in first-class condition.

SASKVILLE, N. B.—The town council has decided to take over the electric plant of the Electric Light and Telephone Company and will conduct it under municipal ownership.

KEOKUK, Ia.—The controversary which has existed for some time between the city council and the Mississippi Valley Telephone Company, bringing all construction work to a standstill, has been ad-

justed and the company will now proceed with the installation of its underground system.

CHARDON, O.—It is claimed that in no other county in the United States are there as many telephones in service as in Geauga county, there being one telephone for every six persons.

MORTON, Ill.—The Tazewell County Telephone Company is erecting several cables from its central office to the outskirts of the village which will be a great improvement to the system.

SAC CITY, Ia.—The stockholders of the Eden Mutual Farmers' Telephone Company recently held a special meeting at Schaller and decided to establish and maintain an exchange of their own.

STATESVILLE, N. C.—The National Electrical Supply Company of Washington, D. C., was recently awarded the contract for installing a new telephone system in this city at a cost of $8,000.

MASON CITY, Ia.—Fifty representatives of the Independent Telephone Association recently held the semi-annual session in this city. The business of the association was found to be in good condition.

BRADFORD, Pa.—A contract for $12,000 worth of terra cotta to be used in the new exchange building of the Home Telephone Company of Detroit, has been placed with the North Eastern Terra Cotta Company of this city.

VALLEJO, Cal.—A special election will be held before the close of the year to determine if the city charter shall be amended, so as to allow the city to own and operate street railways, electric light, gas and telephone enterprises.

MT. PULASKI, Ill.—The work of placing the telephone wires underground is under way. When completed and the offices are installed in the new exchange building, Mt. Pulaski will have the best system of any town of its size.

NO. TONAWANDA, N. Y.—The Niagara County Home Telephone Company has made application to the tax commissioners to have its local franchise assessment reduced to $2,660. It is assessed for $14,000. This will be made a test case.

MAUCH CHUNK, Pa.—An effort is being made to establish a rural telephone line in Franklin township, this county. Those interested are, John E. Hahn, D. H. Lesher, W. B. Adams, E. W. Dreisbach. Thomas LeRose and Harry Rickert.

SHARON, Wis.—The Sharon Telephone Company is extending its service. When the new additions are completed the company will have approximately fifty miles of lines and 218 telephones in service. The company is capitalized at $10,000.

ALBION, Ill.—The Albion Telephone Company has recently been enjoying a nice increase in business. A large number of telephones have been installed and the exchange now has more subscribers than ever before and good service is given.

BUFFALO, N. Y.—The Century Telephone Construction Company of Buffalo, announces that it has again commenced operation and expects to overcome the delay occasioned by the fire which occurred in their factory, in a few weeks.

PEORIA, Ill.—The regular meeting of the Fifth District Independent Telephone Association will be held in this city some time during the first week in December. A call will be issued by President Daily of Chillicothe in the near future.

SIOUX CITY, Ia.—The Sioux City Telephone Company has recently issued a supplementary directory showing an addition of 450 subscribers since the last telephone directory was issued in July, making a total of 3,000 now in service.

ABERDEEN, Wash.—E. C. Finch, who is promoting an Independent telephone system here, has deposited $500 forfeit with the city treasurer. Work must begin on the new line within six months, but it is probable it will begin before that time.

MERKEL, Tex.—The Texas and Pacific Telephone Company has just installed 7,500 feet of cable in Merkel, and other improvements are also being made. The company expects to add from 100 to 200 new telephones to its system in the very near future.

SALINA, Kans.—Work has begun on the construction of a new telephone exchange building by the Salina Telephone Company. The new building is to have every modern convenience and when completed will equal any building of its kind in the state.

OMAHA, Neb.—By a vote of 2 to 1 the Heim-Parmele-Pollock Independent Telephone Company was granted a franchise for the construction and operation of a telephone system. The telephone question was one of the leading issues of the local campaign.

INDIANAPOLIS, Ind.—Work has been begun on a new fireproof building for the Indianapolis Telephone Company, in which will be placed the new switchboard that will be purchased in the near future. The estimated cost of the new building is $50,000.

PRINCETON, Ind.—The work of closing the gap between Princeton, Ind. and Huntingburg, is completed, and the Independent Long Distance Telephone Company of Princeton will have a direct wire to Louisville on the southeast, establishing a new trunk line to eastern cities. When the work is completed the line will be taken over by the Home Independent Telephone Company in which Indianapolis, Evansville, Vincennes and Princeton capitalists are concerned.

PEORIA, Ill.—The school board has decided to equip nineteen school buildings with telephones. Bids have been received from both the Bell and Interstate companies and the committee having the matter in charge has decided in favor of the Interstate company.

STOCKHOLM, Sweden.—A wireless telephone for military purposes, invented by Lieut. C. E. Ljungman, has been accepted by the Swedish army. The invention, which has been offered to America by the lieutenant, has caused a sensation in European technical circles.

PERRYVILLE, Ark.—A new telephone line is being constructed from Perryville via Alpin to Nimrod. The line between Perryville and Nimrod is being reconstructed and an effort is being made to induce the company to extend the line to Hollis and Mountain Valley.

TERRE HAUTE, Ind.—The Citizens Telephone Company has cut over its lines to the new exchange recently installed with a full central energy multiple board. The new plant is regarded as the most modern and up to date plant in the state, its capacity being 5,000 telephones.

WEISSPORT, Pa.—An effort is being made to establish a rural telephone line in Franklin township, Carbon county, extending to this place. Among those interested are the following: John E. Hahn, D. H. Lesher, W. B. Adams, E. W. Dreisbach, Thomas LaRose, and Harry Rickart.

DETROIT, Mich.—It is said Detroit is to have the first portable telephone service in the world. Portable telephones will be rented to owners of automobiles, delivery wagons, doctors and others who are about the city most of the time, and connection boxes will be located in all parts of the city.

SPOKANE, Wash.—E. A. Klippel, superintendent of telegraphs on the Harriman system in Oregon and Washington, is making a series of experiments with train telephones, the purpose being to devise a plan whereby the conductor will be able to converse with any one in any part of the train.

PROSPERITY, W. Va.—A number of farmers of East Finley and Morris Townships have formed a farmers' telephone company and will construct a telephone line from Prosperity to Pleasant Grove and from East Finley to Burnsville. The lines will connect with the Claysville Telephone Company.

OTTAWA, Ont.—Up to September 30 there had been filed with the railway commission over 300 applications for approval of new telephone lines and extensions of existing ones. A large number of the applications come from Manitoba, Saskatchewan, and Alberta, where many local lines are being constructed by farmers.

FULLERTON, Cal.—The Home Telephone Company has completed its main line between Fullerton and Anaheim and will now begin work on the Fullerton exchange. Work will soon begin on the extension to Placentia, Olinda, La Habra, and Buena Park, which will be completed in six months at an expense of about $40,000.

MOBILE, Ala.—The Home Telephone Company which is completing the installation of its new system at Mobile, upon which it has spent over $300,000, expects at once to make long distance connections with towns along the east shore of Mobile Bay, towns along Bay Minette and Fort Morgan railroad, and later to New Orleans.

ELKADOR, Ia.—Farmers in Highland and Marion townships have organized a rural telephone line and are now anxious to get connection with the Standard exchange at this place. A subscription list circulated among the Elkador business men for the purpose of raising funds for building a line to the place is meeting with ready response.

HOULTON, Me.—The work of extending the line of the Independent Telephone Company, under the direction of its new superintendent, Mr. Crane, is progressing rapidly. About 1,000 telephones have been installed by the company and as many more will be installed just as soon as the instruments can be secured and the work done.

BELLEVUE, O.—The Bellevue Home Telephone Company has just issued its directory which shows 886 subscribers connected with the exchange. Numerous country lines have been built, many improvements made and more under way. The underground construction is rapidly progressing and the work of laying the conduits will soon be completed.

LAWRENCE, Kan.—The electrical engineering department of the university has established a new course-telephone operating. A large amount of special apparatus for the course has been installed. In the course all the details of telephone operating will be taught, with opportunity for actual telephone practice. There has been a demand for this kind of a course.

BROWNSVILLE, Tex.—A board of appraisers has been appointed by County Judge Bartlett for the purpose of appraising the value of a right of way along the St. Louis, Brownsville and Mexico railway for the Brownsville Telephone Company from this city to Robstown and from Harlingen to Lonsboro. As soon as the board adjusts the

matter work will be begun on a line, and with its completion Brownsville will have connection with the outside world by long distance connection.

RALEIGH, N. C.—The North Carolina Corporation Commission has under consideration the question of fixing rates of charges for message service, rental of telephones, etc., by the various telephone companies of the state. The commission has sent out letters to the various companies requesting them to forward their present schedule of rates, to be placed on file.

RENFREW, Pa.—The directors of the Pennsylvania Telephone Company, a new organization, which will operate lines in the Renfrew, Brownsdale, Cooperstown, Callery, Ivywood, and Saxonsburg districts, recently held a meeting in this city and decided to dispose of stock in the company to the amount of $3,000, the money realized to be used in the immediate development of the company.

TAMPA, Fla.—The Peninsular Telephone Company has just issued a directory which shows that there are about 2,300 telephones in service in this city. The company is doing its best to improve its service and under the management of W. G. Brorein it is achieving excellent results along that line. In the last four years the number of subscribers has increased from 400 to the present number.

ROCHESTER, N. Y.—Negotiations are pending for the removal of the Buffalo plant of the General Railway Signal Company to this city and its consolidation with the plant of the Pneumatic Signal Company here. The proposal to consolidate the plants is contingent upon the purchase of the Buffalo property by the Century Telephone Company, which is controlled by the Consolidated Telephone Company.

OAKESDALE, Wash.—Failing in an effort to get a general meeting of the members of the rural telephone lines to consider the proposition of accepting or rejecting the offer of the Pacific States Telephone Company to connect with the system in Oakesdale, a resolution is being circulated in which the subscribers agree that they will not enter into any contract with any long distance company.

OMAHA, Nebr.—Announcement is made that the new Independent Telephone Company organized in this city recently will erect a new central exchange and two branch exchanges in Omaha and a branch exchange in South Omaha. The Parmelee and Pollock interest which secured the franchise declares that the exchange will be in operation within a year from the time construction work is begun.

CONVERSE, Ind.—There will be no severing of the connections now existing between the Swayzee Cooperative Telephone Company and the Converse Telephone Company, according to a decision of Judge Paulus in the circuit court. Judge Paulus made permanent the restraining order against the Swayzee company, which was granted the Converse company some time ago, and which prevented the cutting off of the connections.

LA PORTE CITY, Ia.—For some time past the farmers living south and southwest of this city have been dissatisfied with the telephone service they have been receiving from the telephone company. It is quite probable that a new company will be started, as several meetings have been held and committees have been appointed to make arrangements looking toward the perfecting of an organization and to ask for a franchise to enter the city.

BELVIDERE, Ill.—Among the many improvements under way by the Belvidere Telephone Company is the installation of a new switchboard, which will accommodate from four to five hundred more subscribers than at present. Work on the lines over the city is progressing as rapidly as possible, but much cabling and other work remains to be done, and it will be some time before the new system can be put into complete operation.

RED LODGE, Mont.—In conformity with a motion that prevailed at a mass meeting of the business men of this place held recently, declaring it to be the sense of those present that the city should own its own telephone system, a petition has been prepared, and is now being circulated asking the city council to call a special election for the submission to the taxpaying freeholders of a proposition to bond the city in the sum of $10,000 for the construction and installation of a municipal telephone plant.

MT. PULASKI, Ill.—The Mt. Pulaski Telephone Company is inauguarating improvements in its telephone system which will not only include the erection of a fine telephone office building, but practically the reconstruction of its entire system within the city limits and the placing of its wires underground in the business portion. J. W. Collins and Gene Wylie have charge of the work. This work will be carried on entirely independent of the present system, so that there will be no interruption of the service.

CEDAR RAPIDS, Ia.—At a recent meeting of the board of directors of the Cedar Rapids and Marion Telephone Company it was decided to advance the rates as follows: Business telephones, from $30 to $36; residence telephones, individual lines, from $18 to $24. According to an agreement with the city the company had a perfect right to increase its rates four or five years ago, but it has preferred to wait until the list of subscribers had almost trebled before asking its patrons to help pay for the increase of service rendered. The net increase in subscribers to this company during 1905 was 551, and for the first nine months of the present year there was a net gain of 595.

MANKATO, Minn.—President H. A. Patterson, Nic Petersen, D. T. Bowen, Nelson Gray, George M. Palmer, W. D. Willard, Dr. I. D. Webster and Manager W. M. Koons recently held a conference with citizens of Rapidan with reference to the proposed improvement and extension of the Mankato Citizens' Telephone Company's service in that place. Nearly 100 subscribers have been obtained and it was decided to go ahead with the improvements this fall. This will result in placing a large number of farmers in connection with Mankato.

CLEVELAND, O.—The Federal Telephone Company of Cleveland, which formerly held control of the Cuyahoga Telephone Company, United States Telephone Company and a large number of Independent companies in Ohio, being the holding company of the Everett-Moore syndicate, has practically passed out of existence. At a recent meeting the capital stock was reduced from $1,000,000 to $10,000. Originally the capitalization was $10,000,000. The properties of the company have all been sold and the greater portion of the debts liquidated.

GRAND RAPIDS, Mich.—Local managers of a number of Independent telephone companies of the state recently met in the office of the Citizens' Telephone Company in this city to formulate a plan for a state organization of the local managers with the object of mutual profit through instruction and discussion of telephone matters. Among those present were C. R. Kehoe of Jackson, A. A. Burch of Battle Creek, William Robinson of Muskegon, H. H. Hutchins of Saugatuck, H. T. Clough of Owosso, F. H. Howard of Flint, F. V. Newman of this city.

CHATTANOOGA, Tenn.—Under the assessment laws of Tennessee the telephone companies are required to pay a privilege tax of 40 cents per instrument in every county of the state having a population of 40,000, or over, a tax of 20 cents per instrument in every county having a population under 40,000. Reports from the different companies show an increase of business during the past year. The Citizens' Telephone and Construction Company of Lawrence county and the Benton County Telephone Company having almost doubled the number of subscribers.

ANDERSON, Ind.—The officials of the Delaware and Madison Counties Telephone Company held a meeting in Muncie, at which time it was practically decided that the company should erect a new building of its own in this city and install an entirely new plant as soon as the movement can be put through. The matter will not be definitely decided until the annual meeting of the stockholders, which will be held in this city the first of January. Reports from all parts of the territory show the most satisfactory conditions and the company's lines still growing.

BRIGHTON, England.—The *Electrical Review* is authority for the statement that the city of Brighton has followed the recent example of Glasgow, Scotland, and has sold its system to the English Post Office Department. Like that of Glasgow, the corporation of Brighton has been severely beaten in the competition, the National Telephone Company's system having considerably more than double the number of telephone stations served by the municipal system. For some time past the latter system has been at a standstill, and lately its small circle of customers had begun to diminish.

CHAMPAIGN, Ill.—The contract for the new exchange building of the Home Telephone Company of this city has been let to Showers & Loper. The building will be occupied entirely by the telephone company, and it is expected to have the plant housed in its new quarters within six months. The franchises of the company in both cities call for the wires to be placed underground in the fire limits, but it is the intention of the company to place the wires underground between the two cities and also a number of branches. Mr. Manford Savage is superintending the work for the company.

COLUMBUS, O.—The Columbus Citizens' Telephone Company will advance its rates $10 a year for business telephones and $6 a year for residence telephones. But these advances will be cut down somewhat by discounts which will be allowed on the payment of all bills when paid before the 15th of the month following the quarter. In connection with the advance in rates party lines will be established which will furnish telephone service at less than the original rates. One of the reasons for the raise in the telephone rates is the need for laying aside a fund to rebuild the plant when it deteriorates.

LEAVENWORTH, Kan.—The People's Home Telephone Company has begun the construction of a new exchange building to cost in the neighborhood of $20,000. The new company is the successor of the People's Telephone Company of Leavenworth, having purchased the former company with its franchise, which has twenty years to run, in August last. The old company had about 600 telephones in service, but since acquisition of rights by the present company provision has been made for a greatly increased number. A new switchboard with a 4,800 line capacity will be installed, while long distance connections with Kansas City, Topeka, Atchison, St.

Louis, and St. Joseph and all of the important centers of the country is already established. The officers of the company are as follows: President, W. T. Hewitt of Leavenworth; vice-president, William George; secretary and general manager, L. R. Parker; treasurer and superintendent of construction, A. B. Conklin. The work of reconstruction is being carried on under the direction of J. Fred Malthaner.

BURLINGTON, Ia.—The Gate Telephone Company recently incorporated with a capital stock of $10,000, has for its purpose the buying, constructing and owning of telephone stations and telegraph lines, and to acquire all real estate necessary to the carrying on of the business. The following officers have been appointed to act temporarily until a new board is elected: President, William H. Taylor; vice-president, Alfred J. Dean; secretary and treasurer, Thos. Peebles. Burlington will be the principal place of business. The articles of incorporation were drawn up in the state of Minnesota.

COLLINSVILLE, Conn.—The Farmington Valley Telephone Company is endeavoring to secure a line from Cornwall Hollow to Winsted, and if this is done subscribers may secure a toll service well into the Hudson Valley. Some time ago this company purchased a controlling interest in the Sharon Telephone Company, which operates in the town of Sharon and westward into New York state, and by which it has connection with the Columbia Telephone Company, operating in New York state and Massachusetts. The officers of the Farmington Valley company and the Columbia company are the same.

ERIE, Pa.—A summary of the business of the Mutual Telephone Company for the past eight years ending October 1 shows the following figures: Collections, $308,095.08; expenses, $176,060.34; gross earnings, $132,034.74; bond interest, $29,534; net earnings, $102,500.24; dividends, $44,012.50; balance on hand, $58,487.74. The company was organized in 1897 with a capitalization of $50,000. The capital stock has been increased at various times until it is now $500,000. The original capacity of the plant was four hundred and its present capacity is three thousand, which will be still further increased in the near future.

SPOKANE, Wash.—M. A. Phelps, president and treasurer of the Interstate Telephone Company, announces that the $400,000 added to the capital stock of $100,000, will be used in building operations in Spokane, the completion of the exchange at Coeur d'Alene, Ida., the building of the extension to Wallace, Ida., and the completion of the toll line into Spokane. One hundred thousand dollars of the increased capital of $400,000 was subscribed at a meeting on November 2, when the stockholders expressed themselves in favor of pushing plans for the invasion of territory in Oregon and Idaho as well as eastern Washington.

DOVER, Dela.—The Diamond State Telephone Company, controlling the telephone system of the entire peninsula, and of which Harry A. Richardson is president, has, in view of its extension of business, granted to the people of Dover and vicinity free exchange to towns within a radius of eight miles. The agricultural community in which Dover is situated has a population estimated at 20,000 and includes the towns of Rising Sun, Cheswold, Camden, Wyoming, Woodside, Magnolia, Viola, Leipsic, Lebanon, and Canterbury. The business men of Dover regard this as one of the most important steps of the year toward commercial prosperity.

PARKER, S. D.—The Steininger Telephone Company, which has 525 subscribers in this city, with thirteen rural lines radiating in all directions from Parker, besides lines extending from Hurley, Monroe and Dolton, is taking orders daily for additional telephones and lines to be installed in the near future. The company not only builds first-class rural lines and installs the best equipments on the market, but has been investigating rural lock-out systems with a view to adopting same as soon as the demand will warrant. J. A. Steninger, the pioneer Independent telephone man of southeastern South Dakota, is president and manager of the company.

BATAVIA, N. Y.—Representatives of a number of telephone exchanges recently met in this place and formed an association for the mutual benefit of those interested. It is the object to combine into one Independent exchange the farmer lines throughout the county. The officers of the organization are as follows: President, Harry C. Norton, of Byron; vice-president, Merritt D. Simonds, of Darien; secretary, George H. Torrey, of Stafford; treasurer, Henry E. Stevens, of Pembroke; H. B. Daggett, of Buffalo, district manager. A committee was appointed to draw up a constitution and by-laws and another meeting will be held in the near future.

MINNEAPOLIS, Minn.—Since the consolidation of the Twin City Telephone Company with the Tri-State Telephone Company this company is one of the three largest Independent companies in the United States and is not equaled by any other company in this section of the country. Besides the two exchanges in the Twin Cities it has in operation 2,500 miles standard copper toll lines and thirty smaller exchanges. The report for the past fiscal year is as follows: Gross earnings, over $800,000; operating and all other expenses, taxes, insurance, etc., $250,000; interest and dividends, $245,000; maintenance and depreciation, 180,000; surplus, $125,000. There are over 1,500 investors owning bonds and stock of the Tri-State company in St. Paul and Minneapolis whose investments exceed $2,000,000, who have received interest and dividends ever since the company was organized.

TOKIO, Japan.—The telephone business in Japan is a government monopoly and when a subscriber dies his instrument is worth $400 to his heirs, because there is always such a long waiting list of would-be subscribers and the only way to get a telephone is to wait one's turn or buy out some subscriber. Usually the waiting list numbers about 8,000 and the government has neither the instruments nor the working force required to meet the demand. The rental is a flat rate, no matter what the telephone is used for. In Tokio the cost per annum is $40 in gold, in advance, and there are 22,000 subscribers in that city, and thousands more would be glad to give $100 for telephone service.

WASHINGTON, D. C.—Mr. Hamilton King, minister to Siam, writes: The present system of telephones has proved unsatisfactory in the city of Bangkok and a change has been decided upon. The plans, specifications, and estimates are now completed, having been prepared by Henry W. Wilder of New York, and are now in the hands of the post and telegraph department awaiting examination preparatory to the government appropriation necessary for the work. It is estimated that the cost will be in the neighborhood of $50,000. The contract will be let by the public works department. The open tender is rapidly gaining favor in Siam and there is little doubt that this contract will be let by open tender also.

WHEELING, W. Va.—The contest for control of the National Telephone Company has been settled amicably by the sale of the holdings of President Henry Schmulbach and those intimately associated with him to John A. Howard. Mr. Howard is now virtually in supreme control, and he and his friends succeed the formerly dominant Schmulbach interests. It is said that the deal represents the purchase of $100,000 worth of stock. Mr. Schmulbach and L. J. Bayha, both of whom were directors, have severed official connection. The remaining directors are John A. Howard, J. J. Walsh of Baltimore, Thomas O'Brien, Jr., W. C. Handlin and F. J. Park. Other directors will be elected to fill the vacant places.

INDIANAPOLIS, Ind.—The Indianapolis Telephone Company will soon have facilities to handle 23,600 lines. The New Long Distance Telephone Company will have eighty toll circuits entering the switchboard at Indianapolis; and it is alleged that this will be the largest Independent toll board in the United States. Copper circuits have been completed from Indianapolis to Thorntown, Tipton, Elwood, Logansport, Bedford and Gosport. Additional circuits are contemplated to reach South Bend, Wabash, Huntington, Fort Wayne, Anderson, Muncie and Kokomo. The installation of a new switchboard having an ultimate capacity of 17,600 lines; 8,000 equipped; is included among the improvements.

MUNCIE, Ind.—The local directors of the Delaware and Madison Counties Telephone Company recently made their annual inspection trip over the property of the company at Muncie, Anderson, Elwood and Alexandria. They were not only shown all the tangible property of the company, but were given a detailed statement of its recent business. The report showed all the floating debt paid and money in the treasury sufficient to pay twice the usual dividend. It was thought, however, in view of the need of extensions it was best not to declare a dividend at this time. It is probable that the company will resume dividends in the spring. The company's four exchanges have a total of 4,500 telephones in use and about 300 miles of toll lines.

WICHITA, Kan.—The Independent Telephone Company has taken up the matter of increasing its rates with the city council. In support of its action looking forward to the charging of a higher rate the company claims that improvements will have to be made by the company and new and large switchboards installed for the accommodation of a greater number of telephones, and it is said this will necessitate the increasing of rates. To protect the company's interests an extension of five years or more in the time of the franchise is wanted before these heavy improvements are undertaken. The capacity of the system is now too small to properly handle the increased number of telephones which have been added in the past few months.

DIXON, Ill.—The Dixon Home Telephone Company has just issued a directory, the largest the company has ever issued, which contains the names of 1,562 subscribers connected with the home office. The company has doubled the number of its subscribers in the last two years. The Lee County Telephone Company was organized and began business in 1897. This exchange was operated until 1904, when it was purchased by the Dixon Home Telephone Company and the system entirely rebuilt. At the present time there is one telephone for every ten inhabitants in this city and in the territory outside of the city reached by the company's lines it is said that three out of every four farm houses have a Home telephone. The rate of growth is constantly increasing.

OMAHA, Nebr.—The demand of business men of Omaha for an Independent telephone system is based on the fact that the Independent telephones in Nebraska, outside of Omaha, outnumber the Bell telephones more than three to one. The World-Herald is au-

thority for the statement that official figures show that in twenty-eight counties, outside of Douglas, in the South Platte part of the state alone, the Independents have 43,704 telephone subscribers, while the Bell company has 13,231 in the same counties. Out of this aggregate of nearly 60,000 telephones, just about half are farm telephones and the other half business and town residence telephones. Of the farm telephones the Independents have 24,847 and the Bell has 4,094. Of the business and residence telephones the Independents have 19,857, while the Bell has 9,237.

DAGGETT, Mich.—A movement is on foot to organize an Independent telephone company to construct a telephone line from Daggett to Nathan and other points on the Wisconsin and Michigan railroad.

SPOKANE, Wash.—President Tucker of the Empire Construction Company, which has the contract to install the new telephone system in this city, states that the same will be in full operation within a year.

MEXICO CITY, Mex.—The Independent Telephone Company of Mexico City, which already has its underground ducts laid to Chapultepec, Tacubaya, and La Hermita for the distribution of its lines to La Piedad, Tialpam, and Xochimilco, is engaged in laying an underground system to Tacuba.

WARSAW, Ind.—The Commercial Telephone Company has purchased a block which is occupied by its offices and exchange. The company is extending its capacity, having added 200 lines to its multiple switchboard and 500 multiple jacks in sections already in service. In addition to this the company is putting in multiple cables for the full capacity of the board, which is 1,200 lines.

BURLINGTON, Vt.—House bill 311, incorporating the Vermont Home Telephone Company, which with little opposition passed the House of Representatives and the Senate in the present session of the state legislature at Montpelier, has been duly signed by Governor Proctor. It becomes a law upon being signed by the heads of both bodies. The bill provides that the first meeting of the corporation shall be held within three months from the time of its passage for the purpose of organizing.

NORWALK, O.—The rapidly expanding business of the Local Telephone Company has created a demand for a General Superintendent of the entire system. Heretofore each exchange has had a local manager, but there was no one who had entire supervision. W. W. Libhart has been promoted to that position. For the past two years Mr. Libhart has been manager of the local exchange and under his management the system has been greatly improved and extended until it now has over eight hundred subscribers. The company operates the following exchanges: Norwalk, Monroeville, Chicago Junction, Plymouth, New Washington, Milan, Berlin Heights, New London, Wakeman, Attica and Greenwich. In addition it has thirteen toll stations and several hundred miles of toll line. Mr. Libhart will be succeed by H. R. Sykes, manager of the exchange at Plymouth.

SAN ANTONIO, Tex.—The Eureka Telephone Company, with general offices in San Antonio, is one of the leading and one of the largest Independent telephone concerns in Texas. Mr. A. J. Moore, president of the company, is credited with the statement that his company is now operating about the largest number of miles of telephone lines owned by any one Independent company in Texas. He states that the company not only has many miles of lines, but lines that are giving good service. The company is now engaged in rebuilding the line from San Antonio to Kerrville and intermediate points, putting in new circuit, and stringing independent wires from San Antonio to Kerrville and also to Fredericksburg. Mr. Moore is one of the pioneer telephone men of southwest Texas. His lines reach from Kerrville to the coast country and are fed by numerous short lines from interior points.

CLEVELAND, O.—A deal has been closed whereby the United States Telephone Company acquired by exchange of security nine telephone companies throughout the state which have been heretofore operating as subsidiary companies, besides obtaining the controlling interest in one other. The companies taken over are the Columbiana County Telephone Company, the Findlay Home Telephone Company, the Citizens' Telephone and Message Company of Fostoria, the Lancaster Home Telephone Company and the Stark County Telephone Company. The controlling interest was also secured in the Huron County Telephone Syndicate, which operates one of the largest exchanges in the state. The companies mentioned above have been practically owned by the local company since last June, though the actual exchange of the securities was not made until recently.

WORTHVILLE, Ky.—Dr. A. D. Jones, of Louisville, Ky., has invented an instrument for telephoning from a moving train. The instrument was recently given a private test and worked to the satisfaction of the inventor. Following a series of demonstrations in telephoning from a moving train between Carrollton and Worthville papers will be filed incorporating a company to handle the invention. The company which will be capitalized at $5,000,000, will be known as the United States Railway Telephone and Telegraph Company. The incorporation papers are said to have been fully prepared, but the promoters of the scheme are awaiting the final test before placing the documents for record. It is thought the company will be incorporated in the state of Kentucky. Former Governor William O. Bradley and James Gayle of Carrollton, president of the Worthville and Carrollton railroad, are mentioned in connection with the project.

MAPLES, Ind.—The molding and planting of cement telephone and telegraph poles in this vicinity is attracting considerable attention. These poles are being made by H. W. Tapp and are from 25 to 35 feet long, 9 inches square at the base for a distance of 17 feet, and tapered to 6 inches at the top, being octagon in shape from the base portion. They have niches on two sides at convenient distances to accommodate the spurs of a line man, who may wish to climb them, and two holes in the top for the reception of iron rods to hold the cross arms. The poles weigh about 2,500 pounds and are placed in the ground from five to six and a half feet, the depth being regulated by the character of the soil. These are said to be the only poles of the kind in the United States so far as known. The first cost, of course, is considerable, but as they will last indefinitely they are considered cheaper in the long run than wood.

RICHMOND, Ind.—The first concrete telephone or telegraph pole ever manufactured in Indiana and possibly in the West has been made by the Richmond Home Telephone Company and will be erected to test its efficiency. It was designed by Superintendent Bailey. A skeleton framework of four corrugated iron rods is covered with ordinary concrete, the material being poured about the framework while it was inclosed in a box-like mold. The pole is octagonal in shape, thirty feet in length, is provided with mortises, which are to be used by line men when climbing, and is also provided with crossarm mortises near the top. The crossarms are to be fastened in place by means of iron bolts. The strongest point in favor of concrete poles is their durability. Should the experiment with the concrete pole prove successful, it is likely the Home company will substitute them for pine poles as fast as those become unfit for service.

CEDAR RAPIDS, Ia.—The Cedar Rapids & Marion Telephone Company now has over two thousand five hundred telephones connected with its switchboard. The company, which was originally capitalized at $50,000, began business in 1894 with 350 subscribers. In 1901 it was found necessary to increase the capital stock to $150,000 and again in April, 1905, it was found necessary to increase the capital to $300,000, of which $192,000 is now paid up. The total investment in the property at the present time amounts to $304,859. In April, 1905, the company purchased the entire property of the Linn County Telephone Company, which included the exchanges at Marion, Central City, Center Point, Coggon, and the toll lines connecting all other towns in the northern part of Linn county and reaching Anamosa, Monticello, and Manchester. There are now thirteen hundred and eighty-seven subscribers in Linn county outside of the Cedar Rapids exchange.

BELLEVUE, O.—The Local Telephone Company, with headquarters at this place, recently gave a banquet to its stockholders, which number about four hundred, scattered all over northern Ohio. The company began business in July, 1902, with eleven exchanges, having altogether 1,567 telephones and about forty-six miles of toll line. At the present time the company operates eleven exchanges and has 3,487 telephones in service. The rental earnings for the month of October, 1906, were $3,596.66, showing an increase of 100 per cent in four years. The toll earnings for the same month were $1,033.66, showing an increase of 130 per cent for the same period. The total earnings for the last year were $45,517.37, expenses, including operating and maintenance, $24,565.30, leaving a net gain of $18,952.07. The interest and dividends were $15,705, leaving a net surplus of $3,247.07. The officers of the company are as follows: President, Frank A. Knapp; vice-president, J. P. Ruffing; secretary, Fred Wolfrom; treasurer, J. H. Beattie; directors, C. R. Callahan, J. H. Beattie, James Verdin, G. A. Wright, Frank L. Beam, J. P. Ruffing, R. T. Hearson, William Hess, Dwight E. Sapp, Fred Wolfrom, and Frank A. Knapp.

ENOSBURG FALLS, Vt.—The Northern Telephone Company recently occupied its new home, which has been in process of construction the past summer. The company was first started as a private line by C. L. Ovitt, the present manager of the company. In 1895 Mr. Ovitt and M. P. Perley of this place and Dr. William Stanford Stevens of St. Albans organized the Enosburg Falls Telephone Company. In 1898 the present company was incorporated by the same parties. The company now operates exchanges in Enosburg Falls, Richford, and Swanton, has a total of 460 subscribers, and maintains about 700 miles of wire. The officers of the company are: President, William Stanford Stevens; treasurer, M. P. Perley; secretary and general manager, C. L. Ovitt. The new offices of the company are also the headquarters of the Central Telephone Company of Essex, of which system the Northern acquired a controlling interest last December. The Central operates exchanges in Essex and Grand Isle, has 430 subscribers, and maintains from 500 to 600 miles of wire. The officers of the company are: President, Dr. W. S. Stevens; vice president, M. P. Perley; secretary, H. E. Wright; treasurer and general manager, C. L. Ovitt.

ITEMS FROM THE RURAL LINE DISTRICTS

Illustrated by O. H. Brandenburg

Guymon will soon have a complete local telephone exchange.—*Wichita (Kans.) Eagle.*

The telephone men are busy putting up the line to Pipe Lake this week.—*Hutchison (Minn.) Leader.*

Lawson Luttrell, with The Telephone, spent Sunday with homefolks in Cleveland.—*Sweetwater (Tenn.) Telephone.*

The West River Telephone wire will be extended to Gassetts this month. All the villages wires are being collected.—*Rutland (Vt.) News.*

Telephone company have given Humphreys a new 'phone in exchange for their old one.—*South Barrington Correspondent in Palatine (Ill.) Herald.*

The plans are already made for another 'phone line from Conway north of Sharp's Creek in sight of Marquette.—*McPherson (Kans.) Republican.*

Clarno station has a local telephone switchboard for its farmers' line and it is now connected with the Monroe system, with a 5c toll.—*Monroe (Wis.) Sentinel.*

A new telephone has been added this week to the Water street office of The Bangor Daily News correspondent.—*Eastport Correspondent in Bangor (Me.) News.*

It appears that talking from here to Mt. Sterling by 'phone is a thing of the past, as the switches are on a strike.—*Benville Correspondent in Mt. Carroll (Ill.) Democrat.*

The Seymour Telephone company recently extended its lines 1½ miles to the homes of "Honest Ot" Swigart and William Alexander.—*Seymour Items in Champaign (Ill.) News.*

Charles and Albert Kent have taken the job of putting on cross arms and wires for the Rock Creek Brunswick Telephone Company.—*Rock Falls Correspondent in Eau Claire (Wis.) Telegram.*

The Erie Telephone Company are busy installing 'phones in private dwellings. Everybody can talk with everybody now without leaving their homes.—*Rainbow Centre Correspondent in Cayuga (Ont.) Advocate.*

It is about time that the farmers who have interest in the Farmers' Telephone line, get together and see what they will do for a central at Disco, as the time is up.—*Disco Correspondent in Dallas City (Ill.) Enterprise.*

Now is the time to call in and talk telephone with Manager G. H. Mitchell. The gang is expected next week to construct about 25 miles of new wiring, install about 20 new 'phones and clean up for the winter. Get your order in early and save lots of running around in sloppy weather.

A half dozen members of the construction gang of the telephone company, which has been working here for several weeks, got gay at the Union Hotel on Monday evening and indulged in a remarkably strenuous free-for-all fight in front of the dining room door of the hotel. No arrests were made, but the superintendent of construction, who happened to be an eye-witness of the fracas, promptly discharged all of the men engaged therein.—*Union City (Mich.) Weekly.*

H. H. Dillon, of Kansas City, representing the Chicago Telephone Supply Company, was out to the meeting of the Happy Hill Telephone Company Saturday night and sold them a bill of telephones for their line.—*Lone Oak Correspondent in Ruth Hill (Mo.) Tribune.*

A new switchboard has been installed at the depot. Seven wires are now brought into the depot and are at the command of the operator. This is two more wires than were formerly used.—*Colchester (Ill.) Independent.*

W. K. McQuown, a jolly former Havana boy, who is now manager of the Pekin Telephone Company's office at Delavan, is spending the week in Havana attending the carnival and meeting old friends.—*Havana (Ill.) Democrat.*

Mr. Paulsen and his force of men are at work on the telephone line between Elkhart and St. Ann, which will be highly appreciated by all the enterprising farmers along the line.—*Russell Correspondent in Plymouth (Wis.) Reporter.*

The Blacktown Phone Company are talking of extending their lines over to Pardoe. They had better get a hustle on themselves or those fellows from Mechanicsville will be over here before them yet.—*Findley Correspondent in Grove City (Pa.) Reporter.*

L. H. Phillips of Ellsworth and a crew of seven men are boarding at Lily Lake House. The telephone line is being extended from Lily Lake House to the Bay View House, Pretty Marsh, where a pay station is to be established.—*Bangor (Me.) Commercial.*

The first Farmers' Telephone, we are informed, will get all their connections made and the line completed ready to open for business by the first of the coming week. We learn that there will be about fifty farmers on this line to start with.—*Bottineau (N. D.) Courant.*

We understand that the telephone companies of Buckhorn township will have a meeting at the Orr school house Friday afternoon to make arrangements so we can get into Mt. Sterling, as before. Now all turn out, as in a multitude of counsel there is safety.—*Benville Correspondent in Mt. Carroll (Ill.) Democrat.*

Big Falls is now connected, internally, as it were, by a "hello" system, the local telephone exchange having been completed and the 'phones put into working order Monday morning. Charles Swedback owns the new exchange, and from present indications the service is going to be first-class in every respect.—*Bemidji (Minn.) Pioneer.*

George Scattergood, otherwise George Souder, of Fifty-second and Delancey streets, was held under $800 bail for a further hearing by Magistrate Rau at the Twentieth and Jefferson streets station to-day accused of larceny of money from the cash boxes in Bell Telephone booths. Scattergood entered George Fallman's saloon yesterday and asked to use the telephone. He remained in the booth so long that Fallman's suspicions were aroused and he called a policeman, Schwartz, to investigate. They found Scattergood in the act of closing the cash box, which he had opened and rifled. He was recognized as an old offender, whose term in the penitentiary for similar offenses expired on the 6th of this month.—*Philadelphia (Penn.) Bulletin.*

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GEO. T. MANSON, General Superintendent
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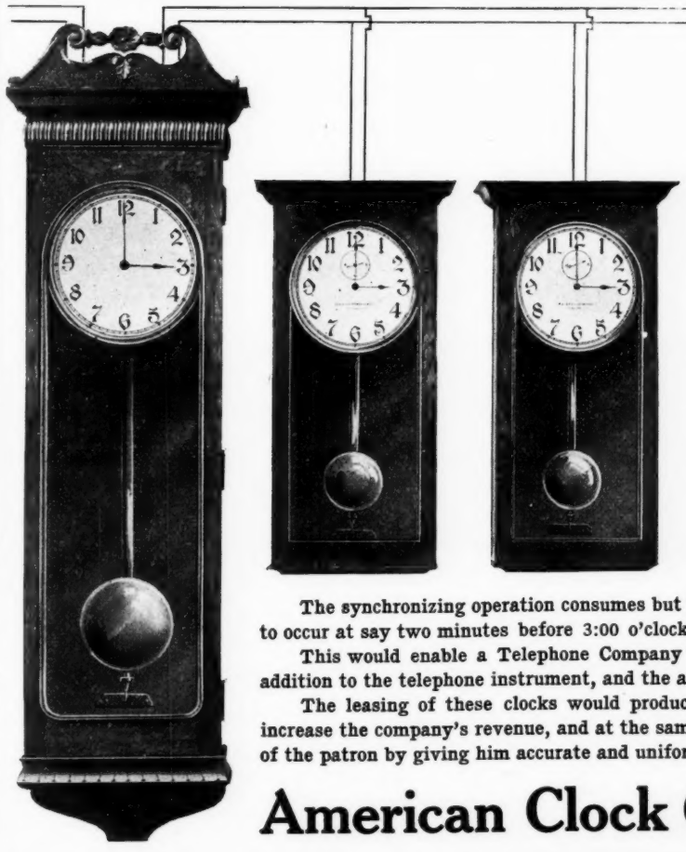

Electric Clocks Synchronized Over Telephone Wires

We desire especially to call your attention to our Electric Synchronizing Clocks, adapted to work in conjunction with telephone systems, being equipped with a synchronizing device which has just been patented.

The system comprises any number of independent Self-Winding Electric Clocks with patented synchronizing attachment located in residences or offices connected with the telephone wires. These clocks are automatically synchronized once every twenty-four hours by an electric self-winding master clock located at the Central Station. It would take but little additional wiring in residences and public offices to make the necessary connections for synchronizing the clocks.

The master clock automatically cuts the telephones out of service, throws in the clock system, and synchronizes all the clocks on the line. The clocks are then automatically cut out of the circuit and the telephone service restored.

The synchronizing operation consumes but two minutes of time of the telephone wires, and could be arranged to occur at say two minutes before 3:00 o'clock A. M., or any desired time.

This would enable a Telephone Company to lease to a patron for a stipulated amount one or more clocks in addition to the telephone instrument, and the additional cost of maintenance would be a very small sum.

The leasing of these clocks would produce a very large profit on the amount invested for them, materially increase the company's revenue, and at the same time it would add in a larger ratio to the comfort and satisfaction of the patron by giving him accurate and uniform time service, which is something he has never enjoyed before.

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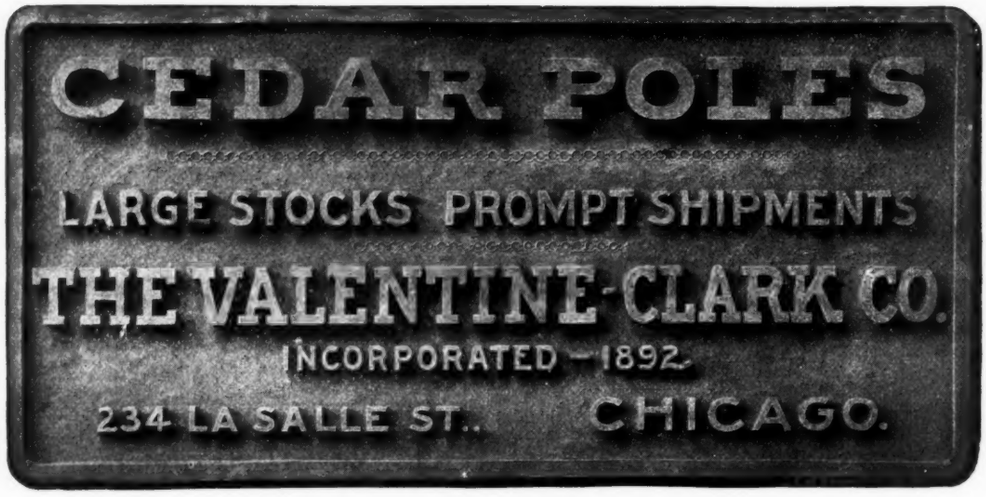

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We have all sizes and lengths of cedar poles on hand all the time and make shipments on the shortest possible notice. Every order receives our most careful attention. We charge nothing extra for the superior quality of stock furnished. Our prices are right, and why shouldn't they be? By having two large yards at Duluth; also at Hawthorne, Wis., Big Falls, Minn., Aitkin, Minn., Deer River, La Porte, Northome and various other concentrating points throughout the cedar producing territories, you get the benefit of the best possible freight rates. Kindly consider how much it means to you to be given prompt and courteous attention and receive your poles when they are wanted.

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CEDAR POLES

LARGE BUTTS

We cut poles from lands owned by our Company in Northern Michigan on Lake Superior Shore, where the cedar is very **sound** and **stocky** with **heavy butts.**
All sizes in stock all the year round.

Write for a Copy of Our Telegraph Code for Cedar Products Giving Valuable Information About Poles.

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30 Foot 40 Foot
35 " 45 "

We have Poles of the above lengths (also other lengths) for sale for prompt shipment

ALSO TIES

Naugle Pole & Tie Company

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CEDAR POLES

FROM THE STUMP TO THE LINE.

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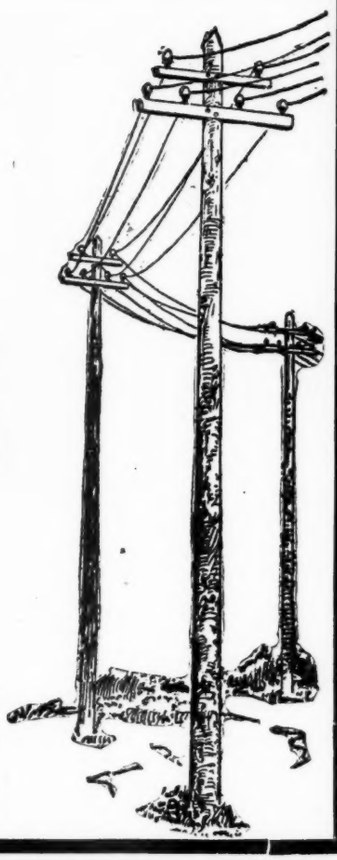

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All Poles Cut From Our Own Timber Lands

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Equal to Cedar But Cost Less

Try a Sample Car and Be Convinced

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Large Stocks, Prompt Shipment, Full Assortment

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4″ 16 ft. 4″ 20 ft. 5″ 25 ft.
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Good Quality,
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Ask us why Chestnut is better than any other.

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WITTENBERG CEDAR CO.

WITTENBERG, WISCONSIN

Please tell the Advertiser you saw his Announcement in TELEPHONY.

White Cedar Poles

3,760	Pieces	4"	16'	140	Pieces	6"	20'
670	"	5"	16'	2,800	"	4"	25'
430	"	6"	16'	1,990	"	5"	25'
1,260	"	4"	18'	820	"	6"	25'
160	"	5"	18'	65	"	7"	25'
90	"	6"	18'	115	"	5"	30'
3,920	"	4"	20'	375	"	6"	30'
930	"	5"	20'	180	"	7"	30'

And other lengths and sizes of POLES—also POSTS.

WRITE FOR DELIVERED PRICES

HOLT LUMBER CO., - Oconto, Wis.

CHICAGO OFFICE: 315 DEARBORN ST.

STOCKS AT

Oconto, Wis., C. & N. W., and C. M. & St. P. Ry. Mountain, Wis., C. & N. W. Ry. Bruces Crossing, Mich., D. S. S. & A. Ry.

Piling
Railroad Ties
Cedar Poles

WHOLESALE TIMBER
LUMBER, ETC.

EDW. Z. MASON

809 D. S. Morgan Building
BUFFALO, N. Y.

Poles Arrived Yet?

¶ Holes all dug and WINTER set in—Now see here:—LET US help you—What do you want White or Idaho Cedar Poles?

¶ We have both—Here's our proposition—You advise us at once what you need, and we will quote you by return mail the cost, but will not ship until received orders to do so from you. GOOD BUSINESS PROPOSITION EH? Try it.

PAGE & HILL CO.

Producers and Cedar Pole Specialists

Lumber Exchange : MINNEAPOLIS, MINN.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

"FROM FOREST TO CONSUMER."

CEDAR POLES

All Sizes Large Stock

Low Prices

Prompt Shipments

LONG POLES A SPECIALTY

WRITE FOR PRICES

The Humbird Lumber Co., Ltd.

SAND POINT, IDAHO

CYPRESS POLES

QUICK SHIPMENTS

ALL LENGTHS
COMPLETE STOCK
LOW PRICES

Write to-day for DELIVERED PRICES

ABELES & TAUSSIG

ST. LOUIS, MO.

Chicago Cedar Pole Co.

605 BERWYN AVE. CHICAGO

Telephone Poles

Large Stock—Low Prices—Prompt Shipment

Send us attached coupon and get our delivered prices before buying elsewhere.

CHICAGO CEDAR POLE CO.,
605 Berwyn Ave., Chicago.

Gentlemen:—Give us prices on the following described poles. We will place our order about _____ (Date); poles to be shipped to _____

_____	Poles	_____	in Top	_____	ft. long
_____	"	_____	"	_____	"
_____	"	_____	"	_____	"
_____	"	_____	"	_____	"
_____	"	_____	"	_____	"

Name _____

Address _____

Please tell the Advertiser you saw his Announcement in TELEPHONY.

PENDLETON & GILKEY

MINNEAPOLIS, MINN.

PRODUCERS OF EVERYTHING
IN CEDAR

CEDAR POLES

All Sizes Large Stock
Low Prices Prompt Shipments

YARDS:
MOUNTAIN, WIS. OCONTO, WIS.

C. H. Dumert Lumber Co.

WHOLESALE LUMBER
WHITE CEDAR
POSTS & POLES
WHITE & RED
CEDAR SHINGLES

MINNEAPOLIS, MINN.

When you need **TELEPHONE POLES** please fill in the following blank and mail to us, and we will quote you our best delivered prices.

_____ 1906

C. H. Dumert Lumber Co.
Minneapolis, Minn.

Gentlemen:—We are in the market for the following strictly first class White Cedar Poles, for shipment to _____

_____ Pieces _____ in. top _____ ft. long
_____ Pieces _____ in. top _____ ft. long
_____ Pieces _____ in. top _____ ff. long
_____ Pieces _____ in. top _____ ft. long

Remarks: _____

An early quotation would greatly oblige. Yours truly,

Name _____

Address _____

CEDAR POLES

FRANCIS BEIDLER & COMPANY
CHICAGO, ILL.

CONTINUOUS PERFORMANCE
Producing and Wholesaling
IDAHO AND MICHIGAN CEDAR POLES
WRITE FOR PRICES
FRANCIS BEIDLER & CO.
CHICAGO, ILL.

POLE YARDS:

MENOMINEE, MICH.
ESCANABA, MICH.
SUPERIOR, WIS.
HERON, MONT.
CHICAGO, ILL.

White Cedar Poles

FROM STUMP TO CONSUMER

We produce our poles so we can make as low prices as anyone

BUY AT HEADQUARTERS

We now have in our Cohasset, Minn., yard a complete stock

Write us for delivered prices

J. W. Morrison Lumber Co.,
General Office, 918-919 Lumber Exchange, Minneapolis, Minn.

Idaho Cedar Poles

PACIFIC COAST POLE COMPANY
Spokane, Wash.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

White Cedar Poles

WE MAKE A SPECIALTY
OF 14 TO 30-FOOT POLES

Prompt Shipments

TRY US TO-DAY

Minneapolis Cedar & Lumber Co.
MINNEAPOLIS MINNESOTA

"CHESTNUT POLES"

Strongest and Best
Large Stock
Prompt Shipment

Let Us Quote You Prices

JAMES I. M. WILSON COMPANY
Bessemer Building, - - PITTSBURGH, PA.

The Lindsley Brothers Co.
Producers and Shippers of
Western Cedar Poles
and Manufacturers of
RED FIR CROSS ARMS
SPOKANE WASHINGTON

...The...
J. B. Galloway Co.
Clarendon, Ark.

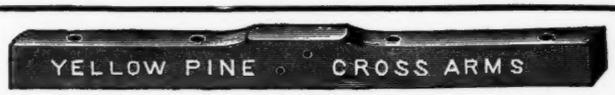
Manufacturers of

Oak and Locust Pins
And Oak Brackets

All Standard Sizes

We also make ALL SORTS OF SPECIAL PINS, from 3 inches in length up to 30 inches, either oak or locust.

We Invite Inquiries for Special Work



Cross Arms, Locust and Oak Pins

STANDARDS AND SPECIALS TO ANY SPECIFICATIONS

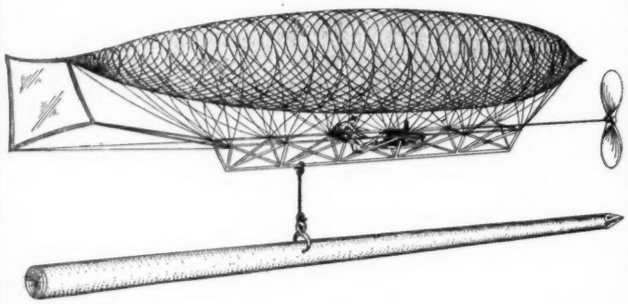
IN STOCK FOR QUICK SHIPMENT

CEDAR POLES OF ALL LENGTHS AND SIZES

THE F. BISSELL COMPANY.
TOLEDO, OHIO

Please tell the Advertiser you saw his Announcement in TELEPHONY.

GOOD
Telephone Poles
AND UP-TO-DATE SHIPPING METHODS



LET US QUOTE YOU ON YOUR REQUIREMENTS

We believe you will appreciate our fine stock, our business methods and our Prompt Shipments.

SAND POINT CEDAR CO.
SAND POINT, IDAHO

PRODUCERS OF POLES THAT PLEASE

FILL OUT FOLLOWING BLANK AND MAIL TO US

SAND POINT CEDAR CO.
Sand Point, Idaho.

Gentlemen:

We will be in the market on.....

For.....Poles of following size:

.....

.....

.....

Name .....

P. O.....State.....

Send Us Your Rush Orders For Oak Insulator Pins and Brackets

Standard sizes always in stock.
Specials on short Notice.
Locust Pins in special sizes only.
Orders for car lots especially solicited.

THE ELKIN MACHINERY CO.
ELKIN, NORTH CAROLINA, U. S. A.

Chestnut Poles

Try spending two cents
getting our prices before
placing your orders

All Lengths Can ship to-day

PADUCAH POLE & TIMBER CO.
PADUCAH, KY.

MICHIGAN WHITE CEDAR
POLES
WILL OUTLAST ALL OTHER KIND

We can fill all size orders from our own stock.

PROMPT SHIPMENTS

25 years have we been producers.

W. C. STERLING & SON CO.

Yards: Bay City, Omer, Boyne Falls
Principal Office: MONROE, MICH.

Yellow Pine Cross Arms
From Alabama Yellow Pine Virgin Timber

We own both timber and mills.

Our Inducements to you are

GOOD MATERIAL QUICK SHIPMENTS

In the market or going to be?

Write us to-day for prices.

Southern Pine Mfg. Co., PADUCAH, KY.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

THE WATCH AND THE TELEPHONE EXCHANGE

are very much alike in the respect that in order to obtain **good service each individual part** must be **GOOD. Good Batteries** are JUST AS ESSENTIAL to good service as good Switchboards, Telephones, etc.

COLUMBIA DRY CELLS

give BETTER and LONGER service than any other dry batteries we know of. Orders promptly filled. Special inducements on yearly contracts.

THE VOTE-BERGER COMPANY

MANUFACTURERS OF FIRST AWARD TELEPHONES AND SWITCHBOARDS

LA CROSSE, WIS., U. S. A.

The Lundquist Automatic System

is the only automatic trunking and grouping system in existence. Thoroughly protected by patents No. 747,197 and No. 776,524 and by numerous other patents and pending applications. The public is warned against purchasing exchanges which infringe these patents.

The Globe Automatic Telephone Co.

Chicago, Ill.

Idaho Cedar Poles

Large Stock. Best Quality. Prices Right. . . . . Write to us before purchasing elsewhere.

HERMAN VOGEL

CLARK FORK, IDAHO

CEDAR POLES

OF ALL LENGTHS AND SIZES

SPECIAL PRICES UPON APPLICATION
PROMPT SHIPMENT A SPECIALTY

A. E. WHITMORE, 230-31-32 Lumber Exchange, Minneapolis, Minn

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Real Reciprocal Insurance

For Electrical Properties at

Electrical Reciprocal Underwriters

Exclusive Insurance for Electrical Properties at Actual Cost

Segregation and Careful Selection of Risks

No Notes—

No Assessments—

No High Commissions—

No Increase in Your Present Rate—

Lessens Actual Cost by Returning You Cash Dividends

Place at least part of your Insurance Here and Save Money Both in Stock Company and Reciprocal Contracts.

Send For Application Blank

Electrical Reciprocal Underwriters

OREGON - MO.

Telephony's Advertisers

¶ During the past month, Independent telephone franchises have been granted at Milwaukee, Omaha and Denver. To properly equip these three important centers with a service characteristic of the Independent telephone industry, it will require an expenditure of approximately $5,000,000. All who are conversant with the telephone situation realize there is an imaginary dead-line drawn about these points where telephone monopoly exists. The contiguous territory to these large cities includes populous suburban districts which will require Independent service. It is hard to estimate even approximately the amount of capital that will be required to develop these districts.

¶ The granting of these franchises will contribute immensely to the prosperity of the Independent telephone industry. Material of every kind from the smallest piece of apparatus to the largest will enter into the construction of these plants. The concern which will reap the greatest advantage because of this added impetus will be very busy filling its orders. The new concerns that are starting every day and are not now overrun with orders will hustle to get their share of the business.

¶ It occurs to us that this is the time for all concerns to advertise. To advertise judiciously, the medium having the largest influence should be selected. This prestige has come to TELEPHONY through long continued valuable service it has rendered in its respective field. Any prospective advertiser who will take the trouble to examine this issue of TELEPHONY will certainly be impressed that its influence is of a substantial and enduring kind.

Adjustaphones.
Chicago Writing Machine Co., Chicago, Ill.

Anchors, Guy.
Everstick Anchor Co., St. Louis, Mo.
Matthews & Bro., W. N., St. Louis, Mo.
Miller Anchor Co., Norwalk, O.
Nagel Electric Co., W. G., Toledo, O.
Wapak Hollow Ware Co., Wapakoneta, O.

Arms, Telephone Transmitter.
Baird Mfg. Co., Chicago, Ill.

Attorneys, Patent.
Clement, E. E., Washington, D. C.
Smythe, Edwin H., Chicago, Ill.

Batteries, Primary.
Central Electric Mfg. Co., Rock Island, Ill.
French Battery Co., Madison, Wis.
Independent Dry Battery Co., Chicago, Ill.
LaSalle Battery Co., Chicago, Ill.
Manhattan Electrical Sup. Co., Chicago, Ill.
National Carbon Co., Cleveland, O.
Nungesser Electric Battery Co., Cleveland, O.
Rock Island Battery Co., Cincinnati, O.

Batteries, Storage.
Gould Storage Battery Co., New York, N. Y.

Boards, Power.
American Electric Telo. Co., Chicago, Ill.
Dean Electric Co., Elyria, O.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Books, Telephone.
Telephone Printing Co., Defiance, O.
Telephony Publishing Co., Chicago.

Booths.
Fisher-Stevens, Charles City, Ia.

Brackets.
Central Tel. & Elec. Co., St. Louis, Mo.
Commercial Elec. Supply Co., St. Louis, Mo.
Elkin Machinery Co., Elkin, N. C.
Galloway Co., J. B., Clarendon, Ark.
Illinois Electric Co., Chicago, Ill.
Peirce Specialty Co., Chicago, Ill.

Brass and Copper.
Scovill Mfg. Co., Chicago, Ill.

Cables.
American Electric Telo. Co., Chicago, Ill.
American Electrical Works, Phillipsdale, R. I.
Commercial Elec. Sup. Co., St. Louis, Mo.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
New York Insulated Wire Co., New York, N. Y.
Okonite Company, New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.

Cable Clamps.
Blackburn, Geo., Cleveland, O.
Diamond Expansion Bolt Co., New York, N. Y.
Yonkers Specialty Co., Yonkers, N. Y.

Cable Grips.
Universal Cable Grip Co., Syracuse, N. Y.

Cable Compound.
Massachusetts Chemical Co., Walpole, Mass.

Calculagraphs.
Calculagraph Co., New York, N. Y.

Call Registers.
Baird Mfg. Co., Chicago, Ill.

Cleats, Fibre.
Blake Signal & Mfg. Co., Boston, Mass.

Climbers.
Blakeslee Forging Co., Plantsville, Conn.
Klein & Sons, Mathias, Chicago, Ill.

Clips, Cable.
Chase-Shawmut Co., Newburyport, Mass.
Cleveland Galvanizing Works Co., Cleveland, Ohio.

33⅓% MORE LIFE

Will Be Obtained By Using

Black Hawk Dry Batteries

THE REASONS WHY:

1st. It has a corrugated zinc cell, thereby giving one-third more surface.

2nd. It has an amalgamating generating matter to protect the same.

3rd. It has a device for the escape of gases which form in chemicals.

4th. It has high amperage, high voltage and marvelous recuperation.

5th. Only the highest grades of material are used.

A Trial Will Convince You of Their Merit

A Real Saving Will Be Effected By Their Use

Black Hawk Dry Batteries

Monadnock Block, Chicago, Ill.

Clocks, Electrical.
American Clock Co., Chicago, Ill.

Coils, Induction.
American Electric Telephone Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Dean Electric Co., Elyria, O.

Conduit, Underground.
American Conduit Co., Chicago, Ill.
American Sewer Pipe Co., Pittsburg, Pa.
Camp Co., The H. B., New York, N. Y.
Fibre Conduit Co., Orangeburg, N. J.
McRoy Clay Works, Brazil, Ind
Peirce Specialty Co., Chicago, Ill.

Connectors.
American Electric Fuse Co., Muskegon, Mich.
D. & W. Fuse Co., Providence, R. I.
Fahnestock Electric Co., Brooklyn, N. Y.
Rolfe Elec. Co., Rochester, N. Y.
Yonkers Specialty Co., Yonkers, N. Y.

Contractors.
Crumb & Co., W. H., Chicago, Ill.
Electrical Engineering Co., St. Paul, Minn.
General Engineering Co., Chicago, Ill.
Jones & Winter, Chicago, Ill.
Miller & McMeen, Chicago, Ill.

Condensers, Telephone.
American Electric Telo. Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Dean Elec. Co., Elyria, O.
Keystone Elec. Telo. Co., Pittsburg, Pa.
Williams-Abbott Electric Co., Cleveland, O.

Cords.
American Electrical Works, Phillipsdale, R. I.
Belden Mfg. Co., Chicago, Ill.
Premier Electric Co., Chicago, Ill.
Runzel-Lenz Elec. Mfg. Co., Chicago.

Correspondence School.
International Correspondence Schools, Scranton, Pa.

Counters.
Baird Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.

Cross Arms and Pins.
Central Electric Co., Chicago, Ill.
Central Tel. & Electric Co., St. Louis, Mo.
Cleveland Galvanizing Works Co., Cleveland, Ohio.
Commercial Elec. Supply Co., St. Louis, Mo.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Electric Co., Pittsburg, Pa.
Elkin Machinery Co., Elkin, N. C.
Galloway Co., J. B., Clarendon, Ark.
Illinois Electric Co., Chicago, Ill.
Maine Hub and Manufacturing Co., West Seboois, Maine.
Nagel Electric Co., W. G., Toledo, O.
Southern Pine Mfg. Co., Paducah, Ky.

Diggers.
Kohler & Co., F. E., Canton, Ohio.

Drop Forgings.
Blakeslee Forging Co., Plantsville, Conn.

Electrical Show.
Electrical Trades Exposition Co., Chicago, Ill.

Engineers, Construction.
Butterfield Construction Co., Chicago.
Crumb & Co., W. H., Chicago, Ill.
General Engineering Co., Chicago, Ill.
Jones & Winter, Chicago, Ill.
McMeen & Miller, Chicago, Ill.
Wilder, George W., Chicago, Ill.

Extension Gongs.
Elec. Mfg. & Equip. Co., Atlanta, Ga.

Galvanizers.
Cleveland Galvanizing Works Co., Cleveland, Ohio.
National Galvanizing Co., Chicago, Ill.

Generators, Telephone.
American Electric Telephone Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
Eureka Electric Co., Genoa, Ill.
Monarch Telephone Mfg. Co., Chicago.
Stromberg-Carlson Tel. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.

Generators, Ringing.
Current Elec. Co., Chicago, Ill.
Sandwich Pole Changer Co., Sandwich, Ill.
Warner Electric Co., Muncie, Ind.

Gloves.
Chicago Glove & Mitten Co., Chicago, Ill.

Guy Clamps.
Cook, F. B., Chicago, Ill.

Hangers, Cable.
American Electric Fuse Co., Muskegon, Mich.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Chase-Shawmut Co., Newburyport, Mass.
Cook, F. B., Chicago, Ill.
National Telo. Supply Co., Cleveland, Ohio.
Standard Underground Cable Co., Pittsburg, Pa.

Head Bands.
Chicago Chatelaine Bag Co., Chicago, Ill.

Instruments, Measuring.
Weston Electrical Instrument Co., Newark, N. J.

Insulating Material.
Faultless Insulating Compound Co., Chicago, Ill.
New York Insulated Wire Co., New York, N. Y.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Standard Underground Cable Co., Pittsburg, Pa.
Stone, M. C., Washington, D. C.

Insulators, China and Porcelain.
American Electric Fuse Co., Muskegon, Mich.
Central Electric Co., Chicago, Ill.
Nagel Electric Co., W. G., Toledo, O.

Insulators, Glass.
Hemingray Glass Co., Covington, Ky.

Insurance.
Electrical Reciprocal Underwrwriters, Oregon, Mo.

Iron, Norway.
Blakeslee Forging Co., Plantsville, Conn.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. G., Chicago, Ill.

Lightning Arresters.
Doubleday-Hill Electric Co., Pittsburg, Pa.
Rolfe Elec. Co., Rochester, N. Y.

Lockers.
Merritt & Co., Philadelphia, Pa.

Material, Construction.
American Electric Telo. Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
B-R Elec. Mfg. Co., Kansas City, Mo.
Bigley Telo. Co., Chicago, Ill.
Bissell Co., The F., Toledo, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Cleveland Galvanizing Works Co., Cleveland, Ohio.
Commercial Elec. Supply Co., St. Louis, Mo.
Cook, F. B., Chicago, Ill.
Dearborn Electric Co., Chicago, Ill.
Doubleday-Hill Electric Co., Pittsburg, Pa.
Electrical Engineering Co., St. Paul, Minn.
Hallett Iron Works, Chicago, Ill.
Illinois Electric Co., Chicago, Ill.
Klein & Sons, Mathias, Chicago, Ill.
Lawrence Elec. Co., F. D., Cincinnati, O.
Manhattan Electrical Sup. Co., Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G., Toledo, O.
Peirce Specialty Co., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.
Sumter Tel. Mfg. Co., Sumter, S. C.
Swedish-American Tel. Co., Chicago.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telephone & Supply Co., Cleveland, O.

Meters.
American Electric Telephone Co., Chicago, Ill.

Miniature Lamps.
General Electric Co., Harrison, N. J.
Jaeger Miniature Lamp Co., New York, N. Y.

Nippers and Pliers.
Klein & Sons, Mathias, Chicago, Ill.

Ohmmeters.
Bissell Co., F., Toledo, O.

Operators' Chairs.
Andrews & Co., A. H., Chicago, Ill.

Please tell the Advertiser you saw his Announcement in TELEPHONY.

Every Letter in the Alphabet has a good word for

The Hargis Cable Splicing Joint

So have all Cable Engineers who have seen it

Adaptable
Better
Convenient
Durable
Economical
Fool-proof
Get-at-able
Handy
Inexpensive
Joint (The)
Komplete
Labor-saving
Moisture-proof
Neat
Original
Patented
Quick
Reliable
Safe
Testable
Unique
Valuable
Weatherproof
Xceptional
Youseful
Zenith (The)

SIGN OF A MONEYSAVER — W. N. MATTHEWS C.L. SPECIALTIES — TRADE MARK ESTABLISHED 1880

Shipped on trial.
Write for Prices and Terms.

W. N. Matthews & Bro.
Manufacturers
226 N. 2nd St. St. Louis

ALSO
Stombaugh Guy Anchors
AND
Callahan Cable Rollers or Trolleys.
BOTH MONEY SAVERS.

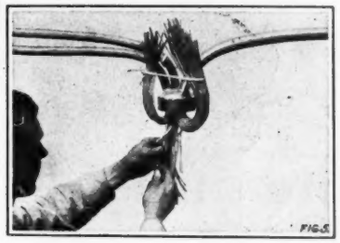


FIG. 5.
Showing cables being spliced after joint has been connected and wiped in.

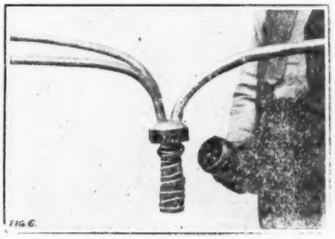


FIG. 6.
Showing completed splice, laced and ready to be closed by screwing on the lead pot or sleeve.

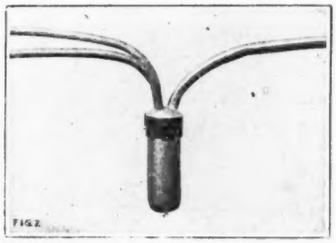


FIG. 7.
Showing completed joint, perfect in every respect. Made without the assistance or expense of an expert splicer.

DIVIDENDS WILL INCREASE and troubles diminish IF YOU SPECIFY

SUPERIOR BRAND

By this name you will know our make of INSULATED IRON LINE WIRE (or Tree Wire) and Galvanized Strand. Wise telephone people use our brand, and that's a pointer for you to write for prices and

DO IT NOW.

WEATHER-PROOF WIRE — SUPERIOR BRAND — STANDARD WEIGHT

Western Insulated Wire Company
MANUFACTURERS
170-174 South Clinton St., CHICAGO, ILL.

FRANKEL'S ELECTRIC TESTING CLIPS
SHORT CUTS FOR TROUBLE HUNTERS

You need not waste time baring the wire

Constructed to test any size line

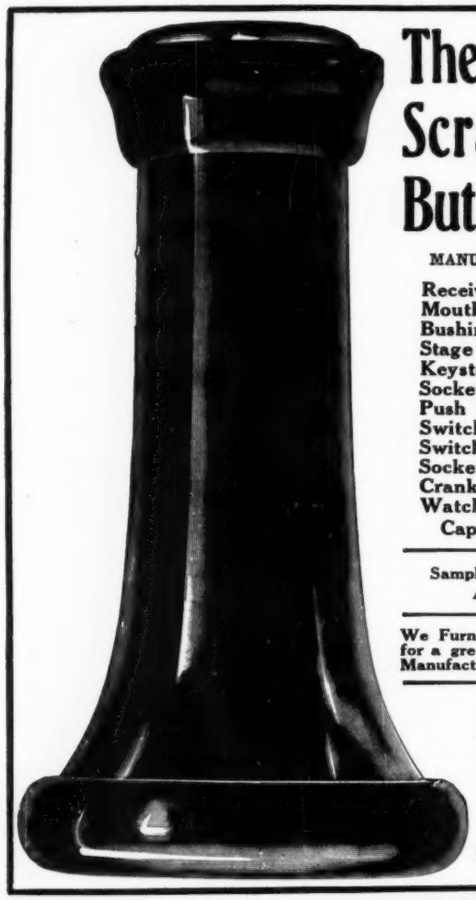
Patented Nov. 15, 1904, and Foreign Countries

Sample Dozen,	12½	Cents	Each
100 Lots	11	"	"
500 "	10	"	"
1000 "	9	"	"

The teeth grip the line or binding post. The pin pierces the insulation and makes a perfect test connection.

From Your Supply House or

FRANKEL DISPLAY FIXTURE CO.
740-742 BROADWAY NEW YORK, U. S. A.



The Scranton Button Co.

MANUFACTURERS OF

Receiver Shells,
Mouth Pieces,
Bushings,
Stage Plugs,
Keystone Bases,
Socket Rings,
Push Buttons,
Switch Handles,
Switch Keys,
Socket Keys,
Crank Handles, and
Watch Case Receiver Caps

Samples Furished on Application

We Furnish Receiver Shells for a great many Telephone Manufacturers

1501 Monadnock Building Chicago

TELEPHONES
Harrison 3262
Automatic 3862

OF all the good money savers introduced by us we consider the

SOLID FUSE

one of the best. It is made of glass and copper burned into one piece. We are now prepared to meet all demands and orders will have prompt attention.

Made in 2 and 2¼ inch lengths and from ⅛ to 2 ampere. Price $1.10 per hundred, lots of 500 or more $1.00 per hundred.

Peirce Specialty Company

241-247 So. Jefferson Street
CHICAGO, U. S. A.

Pay Stations.
Baird Manufacturing Co., Chicago.
Gray Telephone Pay Station Co., Hartford, Conn.
U. S. Coin Register Co., Toledo, O.

Poles, Cedar
Beidler & Co., Francis, Chicago, Ill.
Chicago Cedar Pole Co., Chicago, Ill.
Duluth Log Company, Duluth, Minn.
Dumert Lbr. Co., C. H., Minneapolis, Minn.
Holt Lumber Co., Oconto, Wis.
Humbird Lumber Co., Sand Point, Idaho.
Lindsley Bros. Co., Spokane, Wash.
Mason, Edw. Z., Buffalo, N. Y.
Minneapolis Cedar & Lbr. Co., Minneapolis, Minn.
Morrison Lbr. Co., J. W., Minneapolis, Minn.
Naugle Pole & Tie Co., Chicago, Ill.
Pacific Coast Pole Co., Spokane,
Page & Hill Co., Minneapolis, Minn.
Partridge Lbr. Co., T. M., Minneapolis, Minn.
Pendleton & Gilkey, Minneapolis, Minn.
Pittsburg & Lake Superior Iron Co., Escanaba, Mich.
Raber & Watson, Chicago, Ill.
Sand Point Cedar Co., Sand Point, Idaho.
Sterling & Son, W. C., Monroe, Mich.
Valentine-Clark Co., Chicago, Ill.
Vogel, Herman, Clark Fork, Idaho.
Whitmore, A. E., Minneapolis, Minn.
Wittenberg Cedar Co., Wittenberg, Wis.
Worcester Co., C. H., Chicago, Ill.

Poles Chestnut.
Dillavou & Cassell, Chicago, Ill.
Greenbrier Pole Co., Charleston, W. Va.
Paducah Pole & Timber Co., Paducah, Ky.
Wilson, J. I. M., Pittsburg, Pa.

Poles, Cypress.
Abeles & Taussig, St. Louis, Mo.
Kennett Cypress Hardwood & Lbr. Co., Kennett, Mo.

Pole Changers.
Current Elec. Co., Chicago, Ill.
Sandwich Pole Changer Co., Sandwich, Ill.
Warner Electric Co., Muncie, Ind.

Protectors, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Cook, F. B., Chicago, Ill.
Commercial Elec. Supply Co., St. Louis, Mo.
D. & W. Fuse Co., Providence, R. I.
Eureka Electric Co., Genoa, Ill.
Helios Mfg. Co., Bridesburg, Pa.
Moon Mfg. Co., Chicago, Ill.
Rolfe Elec. Co., Rochester, N. Y.
Sterling Electric Co., Lafayette, Ind.
Williams-Abbott Electric Co., Cleveland, O.

Receiver Cases.
General Insulate & Machine Co., Brooklyn, N. Y.
Scranton Button Co., Scranton, Pa.

Purchasing Agents.
Cox & Co., A. J., Chicago, Ill.

Receivers, Telephone.
Murdock, W. J., Chelsea, Mass.

Reels, Ready Pay Out.
Nagel Electric Co., W. G., Toledo, O.

Seals, Incorporation.
Middleton & Co., J. W., Chicago, Ill.

Solder, Self-Fluxing.
Belden Manufacturing Co., Chicago.

Specialties, Telephone.
Baird Mfg. Co., Chicago, Ill.
Veeder Mfg. Co., Hartford, Conn.

Staples, Insulated.
Blake Signal & Mfg. Co., Boston, Mass.

Steel, Magnet.
Nash & Co., Geo., Chicago, Ill.
Stevens Co., Chas. W., Chicago, Ill.

Supplies, Telephone.
American Electric Fuse Co., Muskegon, Mich.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
B-R Elec. Mfg. Co., Kansas City, Mo.
Bigley Telo. Co., Chicago, Ill.
Baird Mfg. Co., Chicago, Ill.
Bissell Co., F., Toledo, O.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chase-Shawmut Co., Newburyport, Mass.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Elec. Sup. Co., St. Louis, Mo.
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Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
Farr Telephone & Construction Supply Co., Chicago, Ill.
Helios Mfg. Co., Bridesburg, Pa.
Illinois Electric Co., Chicago, Ill.
Lawrence Elec. Co., F. D., Cincinnati, O.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Manhattan Electrical Sup. Co., Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G., Toledo, O.
National Telo. Supply Co., Cleveland, Ohio.
North Electric Co., Cleveland, O.
Peirce Specialty Co., Chicago, Ill.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swedish - American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telo. & Supply Co., Cleveland, O.

Switchboards, Automatic Telephone.
American Automatic Telo. Co., Rochester, N. Y.
Automatic Electric Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Globe Automatic Telo. Co., Chicago.

Switchboards, Common Battery.
American Electric Telephone Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
International Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, Ohio.

Switchboards, Magneto.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, Ohio.
Eureka Electric Co., Genoa, Ill.
Farr Telephone & Construction Supply Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Monarch Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Swedish-American Telephone Co., Chicago, Ill.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telo. & Supply Co., Cleveland, O.

Tape.
Massachusetts Chemical Co., Walpole, Mass.
New York Insulated Wire Co., New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.

Telephones, Adjustable.
American Electric Telephone Co., Chicago, Ill.

Telephones, Automatic.
American Automatic Telo. Co., Rochester, N. Y.
Automatic Electric Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Globe Automatic Telo. Co., Chicago.

Telephones, Common Battery.
American Electric Telephone Co., Chicago, Ill.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.

International Telephone Mfg. Co., Chicago, Ill.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.

Telephone Holders.
Chicago Writing Machine Co., Chicago, Ill.

Telephones, Intercommunicating.
Ackerman-Boland Telo. Co., Chicago, Ill.
National American Telo. Co., Chicago, Ill.

Telephones, Lock Out.
Baird Mfg. Co., Chicago, Ill.
Johnson Elec. Mfg. Co., Chicago, Ill.
Select Telo. Mfg. Co., Springfield, Ohio.

Telephones, Magneto.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Baird Mfg. Co., Chicago, Ill.
Central Electric Co., Chicago, Ill.
Central Tel. & Elec. Co., St. Louis, Mo.
Chicago Telephone Supply Co., Elkhart, Ind.
Commercial Electric Supply Co., St. Louis, Mo.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Eureka Electric Co., Genoa, Ill.
Farr Telephone & Construction Supply Co., Chicago, Ill.
Illinois Electric Co., Chicago, Ill.
International Telephone Mfg. Co., Chicago, Ill.
Long Distance Tele. Mfg. Co., South Bend, Ind.
Monarch Telephone Mfg. Co., Chicago, Ill.
Mountain State Elec. Co., Wheeling, W. Va.
Nagel Electric Co., W. G., Toledo, O.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Sumter Telo. Mfg. Co., Sumter, S. C.
Swedish-American Telephone Co., Chicago, Ill.
Vote-Berger Co., La Crosse, Wis.
Wesco Supply Co., St. Louis, Mo.
Western Telephone Mfg. Co., Chicago.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telephone & Supply Co., Cleveland, O.

Telephone Parts.
American Electric Telephone Co., Chicago, Ill.
Andrae & Sons Co., Julius, Milwaukee, Wis.
Chicago Telephone Supply Co., Elkhart, Ind.
Dean Electric Co., Elyria, O.
Dearborn Electric Co., Chicago, Ill.
Monarch Telephone Mfg. Co., Chicago, Ill.
North Electric Co., Cleveland, O.
Sterling Electric Co., Lafayette, Ind.
Sumter Telo. Mfg. Co., Sumter, S. C.
Swedish-American Telephone Co., Chicago, Ill.
Vote-Berger Co., La Crosse, Wis.
Western Telo. Mfg. Co., Chicago, Ill.
Williams-Abbott Electric Co., Cleveland, O.
Williams Telephone & Supply Co., Cleveland, O.

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Klein & Sons, Mathias, Chicago, Ill.

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Weston Electrical Instrument Co., Newark, N. J.

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American Electrical Works, Phillipsdale, R. I.
Manhattan Electrical Sup. Co., Chicago, Ill.
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Indiana Steel & Wire Co., Muncie, Ind.
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Monarch Elec. & Wire, Chicago, Ill.
Roebling's Sons Co., John A., Trenton, N. J.
Western Insulated Wire Co., Chicago
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Magnet.
Belden Manufacturing Co., Chicago.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Standard Underground & Cable Co., Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

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Roebling's Sons Co., John A., Trenton, N. J.
Standard Underground & Cable Co., Pittsburg, Pa.
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Telephone Switchboard.
Belden Manufacturing Co., Chicago.
National India Rubber Co., Bristol, R. I.
Runzel-Lenz Elec. Mfg. Co., Chicago.
Premier Electric Co., Chicago, Ill.
Wire & Telo. Co. of America, Rome, N. Y.

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Central Electric Co., Chicago, Ill.
Chicago Insulated Wire Co., Chicago.
Dearborn Electric Co., Chicago, Ill.
Nagle Electric Co., W. G., Toledo, O.
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., New York, N. Y.
Standard Underground Cable Co., Pittsburg, Pa.
Western Insulated Wire Co., Chicago
Wire & Telo. Co. of America, Rome, N. Y.

Wire, Rubber Covered.
Chicago Insulated Wire Co., Chicago.
Dearborn Electric Co., Chicago, Ill.
Indiana Rubber & Insulated Wire Co., Jonesboro, Ind.
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., New York, N. Y.
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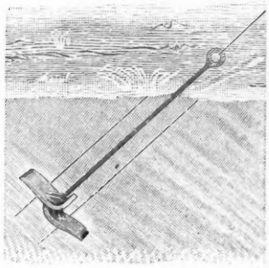

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